

SUPPLEMENT.

The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

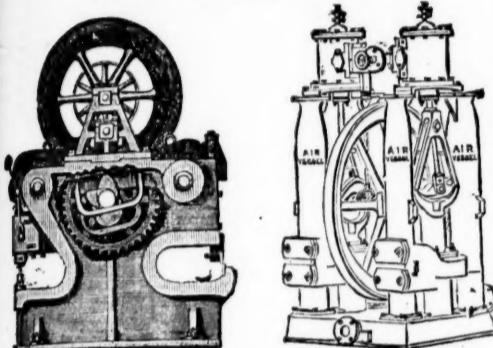
[The MINING JOURNAL is Registered at the General Post Office as a Newspaper, and for Transmission Abroad.]

No. 2179.—VOL. XLVII.

LONDON, SATURDAY, MAY 26, 1877.

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PARIS,
BRONZE MEDAL, 1867.



ORDER OF THE CROWN OF PRUSSIA.



FALMOUTH,
SILVER MEDAL, 1867

A DIPLOMA—HIGHEST OF ALL AWARDS—given by the
Geographical Congress, Paris, 1875—M. Favre, Contractor, having
exhibited the McKean Drill alone as the MODEL BORING MACHINE
for the ST. GOTTHARD TUNNEL.

SILVER MEDAL of the Highland and West of Scotland
Agricultural Society, 1875—HIGHEST AWARD.

At the south end of the St. Gotthard Tunnel, where

THE MCKEAN ROCK DRILLS

Are exclusively used, the advance made during eight consecutive weeks, ending February 7, was 24-90, 27-60, 24-80, 26-10, 28-30, 27-10, 28-40, 28-70 metres. Total advance of south heading during January was 121-30 metres, or 133 yards.

In a series of comparative trials made at the St. Gotthard Tunnel, the McKean Rock Drill continued to work until the pressure was reduced to one-half atmosphere ($\frac{1}{2}$ lbs.), showing almost the entire motive force to be available for the blow against the rock—a result of itself indicating many advantages.

The GREAT WESTERN RAILWAY has adopted these Machines for the SEVERN TUNNEL; the LONDON AND NORTH-WESTERN RAILWAY for the FESTINIOG TUNNEL; and the BRITISH GOVERNMENT for several Public Works. A considerable number of Mining Companies are now using them. Shafts and Galleries are driven at from three to six times the speed of hand labour, according to the size and number of machines employed, and with important saving in cost. The ratio of advantage over hand labour is greatest where the rock is hardest.

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The MCKEAN ROCK DRILLS are the most powerful—the most portable—the most durable—the most compact—of the best mechanical device. They contain the fewest parts—have no weak parts—act without SHOCK upon any of the operating parts—work with a lower pressure than any other Rock Drill—may be worked at a higher pressure than any other—may be run with safety to FIFTEEN HUNDRED STROKES PER MINUTE—do not require a mechanic to work them—are the smallest, shortest, and lightest of all machines—will give the longest feed without change of tool—work with long or short stroke at pleasure of operator.

The SAME Machine may be used for sinking, drifting, or open work. Their working parts are best protected against grit and accidents. The various methods of mounting them are the most efficient.

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The Warsop Rock Drill

(Involving an entirely new principle in Mechanical Boring)

Requires only 20 lbs. steam or air-pressure.

Has only two moving parts—thus ensuring freedom from derangement, and is absolutely self-feeding.

Is excessively light, and can be carried by one man, who can with the NO. 1 size (weighing only 35 lbs.) drill 40 holes $\frac{1}{2}$ in. diameter and $1\frac{1}{2}$ in. deep per minute, in the hardest Aberdeen granite for splitting purposes.

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IMPORTANT NOTICE TO MINE PROPRIETORS.

M. GEORGE GREEN, ENGINEER, ABERYSTWITH.
SUPPLIES MACHINES under the above Company's Patents for
DRESSING ALL METALLIC ORES. Dressing-floors having these Machines pos-

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1.—THEY ARE CHEAPER THAN ANY OTHER KIND IN FIRST OUTLAY.

2.—ONLY ABOUT ONE-FOURTH OF THE SPACE USUALLY OCCUPIED
BY DRESSING-FLOORS IS REQUIRED.

3.—FROM 60 TO 70 PER CENT. OF THE LABOUR IN DRESSING, AND
FROM 5 TO 10 PER CENT. OF ORE OTHERWISE LOST, IS SAVED.

4.—THEY ARE THE ONLY MACHINES THAT MAKE THE ORE CLEAN
FOR MARKET AT ONE OPERATION.

They have been supplied to some of the principal mines in the United Kingdom and abroad—viz.,

The Greenside Mines, Patterdale, Cumberland; London Lead Company's Mines Darlington, Colbry, Nanthead, and Ballyhope; the Stonecroft and Greyside Mines, Hexham, Northumberland; Wanlockhead Mines, Abington, Scotland (the Duke of Buccleuch's); Bewick Partners, Haydon Bridge; the Old Durham Egg-mines, and Ystumtum Mines, in Cardiganshire; Mr. Beaumont's W.B. Mine, Darlington; also Mr. Sewell, for Argentiferous Copper Mines, Peru; the Blaeberry Copper Mines, Norway, and Mines in Italy, Germany, United States of America, and Australia, from all of whom certificates of the complete efficiency of the system can be had.

WASTE HEAPS, consisting of refuse cherts and skimpings of a former washing, containing a mixture of lead, blende, and sulphur, DRESSED TO A PROFIT.

Mr. BAINBRIDGE, C.E., of the London Company's Mines, Middleton-in-Teesdale, by Darlington, writing on the 20th March, 1876, says—"The yearly profit on our Nanthead waste heaps amounted last year to £2000, besides the machinery being occupied for some months in dressing ore-stuff from the mines. Of course, if it had been wholly engaged in dressing wastes our returns would have been greater; but it is giving us every satisfaction, and bringing the waste heaps into profitable use, which would otherwise remain dormant."

Mr. T. B. STEWART, Manager of the Duke of Buccleuch's Mines, Wanlockhead, Abington, N.B., writing on 20th March, 1876, says—"I have much pleasure in stating that a full and superior set of your Ore Dressing Machinery has been at work at these mines for fully a month, and each day as the moving parts become smoother, and those in charge understand the working of the machinery better, it gives increasing satisfaction, the ore being dressed more quickly, cheaply, and satisfactorily than by any other method."

Mr. BAINBRIDGE, speaking of machinery supplied Colbry Mines, says—"Your machinery saves fully one-half on old wages, and vastly more on the wages we have now to pay. Over and above the saving in cost is the saving in ore, which is at much short of 10 per cent."

GREENSIDE MINE COMPANY, Patterdale, near Penrith, say—"The separation which they make is complete."

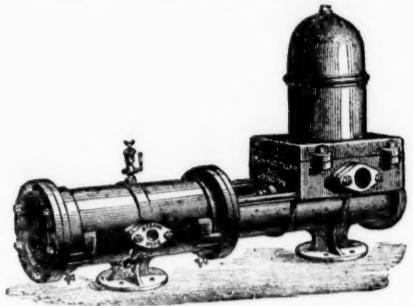
Mr. MONTAGUE BEALE says—"It will separate ore, however close the mechanical mixture, in such a way as no other machine can do."

Mr. C. DODSWORTH says—"It is the very best for the purpose and will do for any kind of metallic ores—the very thing so long needed for dressing floors."

Drawings, specifications, and estimates will be forwarded on application to
GEORGE GREEN, M.E., ABERYSTWITH SOUTH WALES.

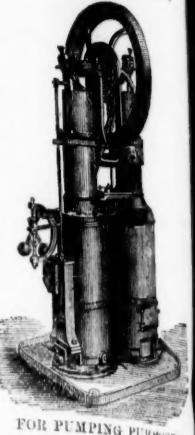
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"The 'Universal' (H. Tyler and Co.) Pump can certainly claim to be the simplest machine of its kind in the Exhibition."

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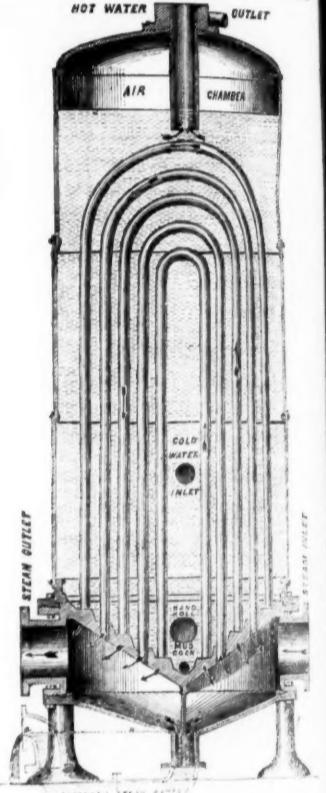
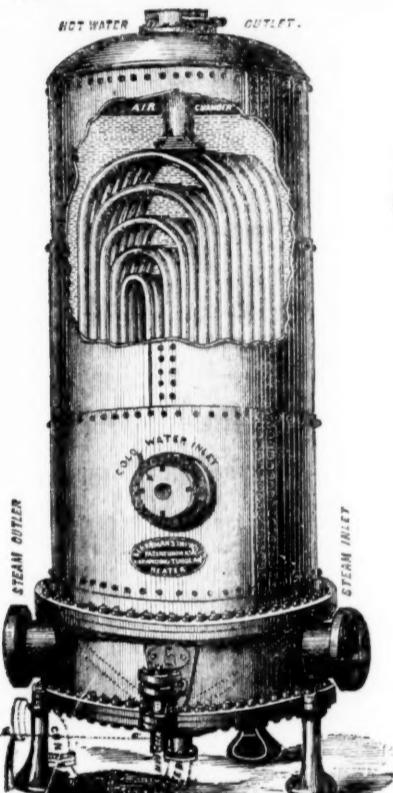
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(LIMITED),

NEPTUNE FORGE ENGINE
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TIPTON, STAFFORDSHIRE,



Having purchased the Engineering Business lately carried on by R. BERRYMAN AND CO., at 23, Congreve-street, Birmingham, and 28, Wilson-street, Finsbury-square, London, have removed the whole to their Works at TIPTON, to which place ALL COMMUNICATIONS SHOULD IN FUTURE BE ADDRESSED, and where the BERRYMAN HEATER can be seen at work, and in every stage of manufacture.

Being the SOLE MAKERS and PATENTEES of these CELEBRATED COAL SAVERS and EXHAUST STEAM UTILISERS, and having remodelled and greatly improved them, adding largely to their HEATING SURFACE and WATER CAPACITY, J. W. and Co. have put down a special plant, which includes an entire new set of improved patterns, enabling them to offer these FEED WATER HEATERS to the public at

GREATLY REDUCED PRICES.

This arrangement of BRASS TUBES of a great length giving an enormous HEATING SURFACE makes this HEATER not only the MOST POWERFUL ever invented, but its FIRST COST PER FOOT OF HEATING SURFACE IS LESS THAN HALF THAT OF ANY OTHER. It will condense the whole of the Exhaust Steam from the Engine if required, and entirely does away with the NOISE and BACK PRESSURE from exhaust pipes.

ALL THE TUBES ARE OF SPECIALLY PREPARED SOLID DRAWN BRASS AND COPPER; both ends are expanded into the bored holes of the same Tube Plate, METAL TO METAL, and every tube is free to expand and contract independent of each other. Leakage is impossible, as, when the tubes are once fixed, nothing short of cutting out will remove them. No scurf adheres to the tubes because of the difference of expansion between SCURF and BRASS. The inside of the Heater can be washed out by means of the mud cock and hand hole whilst at work.

Only one pump or injector is required, and as the Heater is placed between the pump and the boiler, the water is forced, COLD, into it, and passes out at the top hot into the boiler direct. Where the WATER WORKS PRESSURE is sufficient no pump or injector is needed.

The water being heated to BOILING POINT UNDER PRESSURE in the Heater, a saving of from 20 per cent. to 25 per cent. in fuel is effected; the disastrous results of grease in boilers are also avoided.

Every part can be lined with BRASS, COPPER, or LEAD, as may be required in special cases for heating water or any kind of liquor in large quantities for CHEMICAL WORKS, BATHS, WASH-HOUSES, AQUARIAS, GREENHOUSES, BREWERIES, WOOL WASHING, DYE WORKS, TANNERIES, &c., &c.; they will also HEAT AIR FOR CUPOLAS AND BLAST FURNACES, and are now at work as INTERHEATERS for compound engines with direct steam from the boiler with a further saving of 15 per cent.

The New Price List, with detail information, is now ready, and will be sent on application, together with an Illustrated Catalogue, with references and testimonials from Firms using TWO HUNDRED AND THIRTY-THREE of these Heaters.

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Boiler Tubes, Hydraulic Tubes,
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(ESTABLISHED 1790).

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Manufacturers by STEAM POWER of all kinds of Wire Web, EXTRA TREBLE STRONG for LEAD AND COPPER MINES.

Jigger Bottoms and Cylinder Covers woven ANY WIDTH, in Iron, Steel, Brass, or Copper.
EXTRA STRONG PERFORATED ZINC AND COPPER RIDDLES AND SIEVES.

Shipping Orders Executed with the Greatest Dispatch.



Original Correspondence.

THE TRADE IN IRON AND COAL FOR THE FIRST THIRD OF 1877.

The attention of the public is at present more directed to the iron trade than to any other branch of commerce, because of the long and severe depression to which it has been subjected. We have often insisted upon the fact before it was generally recognised that British mines for metals and minerals, taken as a whole, constituted the great basis of our trade. It is to our coal and iron that the two most important branches of our textile manufactures owe their power—cotton and woollen—and although in a less degree the linen fabrics of Ireland, and also of Great Britain, owe their ascendancy. It would be a useless repetition of what we have often urged upon the consideration of our readers were we to recount the fact that in all branches of British trade, mines, either metalliferous or mineral, supply the great fundamental resources of our powers of production. The trade in iron, as it affects miners, manufacturers, and merchants, has for a considerable period been depressed. A very general opinion has prevailed that this has been caused by foreign competition, but this judgment is not sustained by a close examination of statistics, although of a certainty in the finer branches of iron manufacture France, Belgium, and Germany have to some extent successfully competed with us. The real reason of our falling iron exports has been that our customers have been poorer, and unable to deal with us, and as far as railway iron was concerned that they were already well supplied by British imports or their own manufacture. The present aspect of the export trade can best be seen from the Custom House Returns, and, on the whole, it is not unfavourable.

Taking our entire trade in iron in review it is seen that our imports of iron ore for the first third of 1877 was valued at 336,540L, an increase of more than 150,000L on the same period in previous years on an average, showing that our own manufacture of iron had increased, but rather making against the quantity of iron ore produced at home. The imports for the month maintain about the same proportions. Bar-iron was imported to a very much less degree than usual. The figures for the three years in the same period stand at 217,945L, 201,896L, and 159,501L. The import of unwrought steel this year was valued at 23,580L, a little less than the third of that of last year. The import of manufactured iron was 482,064L, a slight advance upon the usual imports. It is, however, to be observed that the "re-export" of iron amounted to about one-fourth of all that was received, and the export of foreign steel was nearly equal to all we received. These circumstances are rarely, indeed hardly ever, taken into consideration by the general Press when commenting upon our imports of iron and steel. The total values of iron exports for the first third of this year has been over 5,750,000L, against about 180,000L more in the corresponding period last year, and nearly 1,250,000L more than in that of 1875. It is, however, important to notice that notwithstanding lower values quantities have increased, the total of iron and steel exported having been 64,014 tons, against 60,341 tons last year, so that there is an evident improvement in the amount of business transacted, but which takes place at lower prices, the margin of profit on the part of makers not being less, because coal, wages, railway carriage, and shipping freights are all cheaper. Taking the month into review, the characteristics of total export are similar to the longer period. The value was 1,631,324L against 1,709,726L, and the quantities were 197,495 tons, compared with 185,882 tons.

Examining the exports in detail, we shall first take steel. Manufacturers of steel, or of steel and iron combined, were valued at 212,333L for the four months, slightly less than in the corresponding period last year, but the tonnage was 3,085—67,000—more than last year. The value for the month was 64,405L, and the tonnage 1,062, the fall in value corresponding with that for the four months, the increase in quantity being over 100,000 tons beyond last April twelve months, and 67,000 over April, 1875. We shall examine other departments according to their importance. Cast or wrought and all other manufactures are computed together (except ordnance), and answer for a larger amount than any other class of iron exports. The value for the longer period is 1,097,791L, about 147,000L less than last year. But here, again, quantities are in favour of the present year, being 76,031 tons, against 72,357 the first third of last year, and 70,729 in the period of the year before that. The month shows a value of 313,961L, which is about 50,000L about the average of the four months; it is, however, 37,000L less than last year. The month shows the same proportions as to quantities. Tin-plates constitute the next most important branch of the trade. The value for the last four months was 982,639L, against 957,611L in the corresponding period last year. The increase is due to the improved trade in April, when the computed value was 279,690L, against 244,823L in the corresponding month last year. The quantities also demonstrate an improved business for the first third of the two years respectively; the figures were 48,257 tons this year, against 41,752 tons last year; and during April 13,940, against 10,702 the April before, and 10,816 the April before that.

Railroad iron stands next in consequence. The value was 814,027L, a slight falling off in comparison with last year, but not very much beyond half the value of the previous year. The month shows a great increase, being far above its average in the four months; the value was over 250,000L, not far short of last year. When we look at quantities, there are 100,177 tons for this year against 94,424 last, and the increase for the month is more in proportion. A better price for tin-plates has obviously been obtained in the month of April. Next in range comes the classification of hoops, sheets, boiler and armour plates, including galvanised. The value for this year, so far, has been over 750,000L, more than 100,000L less than in the same portion of last year, and the decline on the month of April continued. But here once more quantities come to the front in favour of 1877; there were 57,524 tons exported this year, nearly 700 tons more than last year. In April there were 13,519 tons, about 123 tons more than in April, 1876. Since the present month commenced the exports of galvanised have increased. Pig-iron figures for 726,324L, a falling off to the extent of 63,000L from the period with which it is compared. During the month two-thirds of this decline occurred, notwithstanding that the exports for April were heavier than for any other month of this year. There was a falling off in quantities also for the month, although an increase of a few thousand tons for the third of the year. Since April closed there have been better reports of Scotch pig. Bar, angle, bolt, and rod are grouped together in the returns, and are valued at 661,291L, an increase of over 20,000L upon the same period last year. This was entirely gained last month, as but for an increase of 23,000L then there would have been a decline of 30,000L upon the year. Wire of iron or steel, not included in steel or mixed manufacture, answers for over 750,000L, a slight increase upon last year. This increase, as in the last-named department, was entirely achieved in April. The value for that month having been 60,518L. In quantities there is a decided advance over the previous two years, and over the corresponding month of each year.

The United States used to relieve us of our old iron, but her import of it for April, 1875, of 6092L, has dwindled to 233L; nevertheless, other customers have come in, and there has been a considerable increase both in values and quantities; the value for this year was 26,757L, an increase of 30 per cent.; the month maintains the same proportion in its advance.

In certain appendices to the Custom House Returns the value of iron rails is placed by conjecture at 220,497L, as against 479,207L for the four months, and 93,964L, as against 121,341L for the month of April. The value of steel rails for this year is 346,839L, against 194,755L last year. The quantities are proportionate. From these addenda to the returns we are shown plainly that our export of iron rails is declining, and of steel rails increasing.

The course of the iron trade has been in some respects disheartening, or would be so but for the indications of increased demand by larger quantities exported. The United States is the greatest importer of tin-plates, and this trade with the Union improves in declared value and quantities, but for cast or wrought the decline is

formidable, for hoops and sheets it slightly improves, but for steel and railroad of all sorts the decline, not so much from last year, but from the usual course of custom, is signal. Australia is an excellent, and growing customer, and likely to continue so, especially for rails. India also deals largely with us in some departments, particularly cast and wrought iron, hoops, sheets, and boiler plate, and railroad iron. Much has been said of late as to the rivalry of Belgium, but it appears that during the four months we exported iron pig to that country of the value of 105,908L, nearly the same as last year. To Holland we sent pig-iron to the extent of 155,249L; to France, 99,113L; and to Germany, 192,174L. This certainly does not look like a dangerous competition with us on the part of continental Europe, although at the outset we admitted that there is some competition in the finer qualities of iron manufacture. Russia, Spain, Sweden, and Norway have dealt with us to a large extent for rails. In this respect Russia was our best customer, taking 118,383L. British North America bought bar-iron to the extent of 62,000L.

As coal is usually noticed in articles on the iron trade, we may state that the value of our exports this year has been 2,236,496L, a falling off of a quarter of a million from last year, and nearly as much from the year before. The trade greatly increased last month, but fell somewhat short of April, 1876. But an examination of quantities shows an increasing and prosperous demand for the mineral by foreign nations. France is by far our largest customer, taking one-fifth of the whole, Germany a tenth, Spain, Italy, Sweden, and India are all large customers.

We cannot resist the impression, notwithstanding the despondency expressed in many quarters, that there is a good feature for the export trades in coal and iron.

COMPRESSED AIR—LIABILITY OF MANAGERS.

SIR.—I notice in last week's Journal that Mr. Colwell is descanting on the advantages of compressed air. It is only fair to say that many of the advocates of the present system have been astonished at the length of time that five men lived in the Welsh mine. So far as I can make out they were confined in a space of 15 cubic yards, and yet they do not seem to have suffered from defective air. I should like much if any scientific man could explain this.

It would be difficult in main roads to work with compressed air, but in tunnel driving, and some descriptions of sinking, it might readily be done if there was any advantage to be gained. By the way, I notice that the manager of the Welsh colliery has been committed for manslaughter. Now, if this verdict is sustained in a criminal court to a certainty the relatives of the deceased have a good case against him for compensation; and, if they choose to sue him, and he has anything to lose, they will take it from him. Now, this is a hard thing, and a manager is not paid for such risks. I hold that the owners should in such a case pay the damages, not on sufferance, but as a matter of right.

ENGINEER.

PREVENTION OF EXPLOSIONS IN COAL MINES.

SIR.—I listened to the reading of Mr. Steavenson's paper on an Improved Method of Detecting Small Quantities of Gas, at the Northern Institute of Mining and Mechanical Engineers, with the greatest attention and interest. It is, of course, so long as shot firing is allowed where safety lamps are in use, of the greatest possible importance that the officer intrusted with the duty of examining the place when a shot is to be fired should have the best means that can be devised of detecting either large or small quantities of explosive gas.

In the paper of Mr. Steavenson it is stated that as coloured glass absorbs light or flame, a small slip of blue opal glass placed before the flame of a Davy lamp enables "the observer to detect the presence of gas when quite invisible to the unassisted eye; the yellow flame having a clear white appearance, and the blue cap a much more distinct and striking effect." Now I have, with other practical miners, carefully tried the experiment so far as we can understand it here, that is with a piece of fine blue opal glass, and the result is that the flame shows a blue colour exactly similar to the colour of the gas, and the result is a decided disadvantage, as we can discern the gas sooner with pricker in the ordinary way than by using the glass alluded to. It is quite possible that we have got glass of a shade or make not suitable for the purpose, and we will be very glad if any correspondent of the Journal will enlighten us on this subject.

A VIEWER.

THE USE OF THE BAROMETER IN CONNECTION WITH THE WORKING OF COAL MINES.

SIR.—There is no doubt whatever that the barometer is a very useful—but it would be a mistake to consider it a perfect—instrument, it is certainly capable of improvement; there are also various kinds or forms of barometer, and it is, perhaps, worth looking a little into this part of the question. An ordinary upright mercurial barometer commonly in use at mines is steady and reliable, but its movement is slow and so small that the gas has no doubt moved before the movement of the barometer has attracted much attention. A large aneroid barometer is more sensitive, and has a larger range than the one named above, and it is an advantage to have one, but there is little doubt that we require a portable barometer of improved make, sensitive, and having as long range as possible. It has been stated lately that Mr. Remier, of Paris, barometer maker to the French Academy, has invented a barometer suitable for miners, perhaps some of your correspondents can describe the improved instrument.

A. R.

CAKEMORE COLLIERY COMPANY.

SIR.—I observe a short paragraph in last week's Journal which, although literally correct, might without some explanation give rise to a misunderstanding on the part of the shareholders and others who have been led to expect that the make of bricks at this colliery would considerably exceed the 60,000 a week mentioned by you. The reason why the make does not at present exceed that quantity is that the directors considered it absurd to purchase and draw at a cost of about 30s. per 1000 the bricks required for building the additional kilns when by utilising those already erected they could be made on the property at about 12s. 6d. per thousand; the result is that until these new kilns are completed (which will be within a week or two) the kiln power is not up to the capacity of the brickmaking machines and drying floors, which are capable of turning out fully 180,000 bricks a week. I may also add that Mr. Clayton, sen., (of Messrs. Clayton, Son, and Howlett, the celebrated brick machine makers), was at the colliery a few days since, and pronounced the bricks as of first-rate quality, which is confirmed by the ready demand for them in the neighbourhood, orders being already in advance of the make.

A. W. SNELLING, Secretary.

AIR COMPRESSORS AND ROCK DRILLS.

SIR.—Since the notice on Air Compressors and Rock Drills, in the Supplement to the *Mining Journal* of April 21, I have received a copy of Capt. Drake's report to the directors of the Eberhardt and Aurora Mining Company, from which is taken the following extract:—"The air compressing machinery and rock drills ordered of Mr. J. G. Cranston, Newcastle-on-Tyne, while I was in London, were perplexingly long in transit, not arriving upon the ground till Oct. 2. The erection of the machinery occupied some two weeks, and the drills not fairly running before Oct. 20. After a little practice by the men in working the drills a good degree of progress was attained. The general character of the ground through which we have passed is firm hard lime rock, but it generally blasts well, and only a set of timbers is required. The tunnel machinery is working quite satisfactorily, but I fear that possibly the air compressing engine will not prove of sufficient capacity for driving the tunnel to completion. The three drills are doing good work, but as our rock is so hard the strain and wear upon them is of necessity very great. There will be need of adding to their number, either of the same kind or some other good drill."

Previous to ordering the machinery alluded to in this report Capt.

Drake had carefully examined several of the most prominent rock-drill machinery in this and other countries, and finally selected the above-mentioned machines as best applicable for his purpose. In a letter to Mr. A. Critchett, dated April 24 last, Capt. Drake, on his return from a tour to the various mining companies, particularly with reference to the tunnel works in the Comstock Mines in California, reports—"After having visited and carefully inspected the workings of the principal patterns of drills used we are pleased to believe there is no better drill than the Cranston, which is doing most excellent service," and requests that more of the same machines should be sent out. [These are now being sent.]

Some contributors to the *Journal*, when writing upon the relative merits of drill mining machinery, more particularly with regard to cost per foot, seem to disregard or are unaware of the vast difference in the price of fuel and stores and labour, the latter being as 3s. 9d. to 16s. paid by the Eberhardt and Aurora Company in Nevada, also the nature of the rock and mineral substance being driven into; upon which matter Capt. Drake adds, in the same letter—"The tunnel is exceedingly strong hard blasting rock—it can hardly be possible to find worse, but the usual headway is still made, 36 ft. per week." One machine has recently accomplished in a four months' run over 7000 ft. of shot-holes without any cost whatever for renewals or repairs, and are regularly drilling the blast-holes in limestone rock, which previously cost from 9d. to 1s. per foot to drill by hand, at a cost less than 2d. per foot, including cost of fuel, labour at boiler and machine, fettling drill-bits, and repairs to boiler. These machines are employed in various mines for drilling blast-holes in many different positions where it would be quite impracticable for the miner to drill them in by hand. Holes several feet long are frequently drilled by the machines vertically into the roofs; by this means large quantities of mineral are quickly and economically quarried down by a single shot-hole. A number of these machines can be seen in practical operation, regularly doing the work at a cost less than one-fourth that of hand-labour.

Grey street, Newcastle-on-Tyne, May 23. J. G. CRANSTON.

ROCK DRILLS.

SIR.—Whatever may be the custom in other counties, in North Yorkshire the miner's shift is six hours, not eight. We have, therefore, four shifts in the 24 hours instead of three. It is not the usual practice with us to work continuously through the 24 hours, although for special reasons we do so occasionally. The reason is that we find by experience that eight men in four shifts will not do twice as much work as four men in two shifts, neither will they do it at the same price. Your correspondent "M. E.'s" statement that three shifts of men working eight hours will cut three times as much ground and for the same price as one shift working eight hours and choosing their own time is contrary to all mining experience.

Let anyone foolish enough to believe in such a theory come and try it in a mountainous district like this, where the snow is 2 or 3 ft. thick on the hills, the thermometer 10° or 12° below freezing, all the water-courses frozen up, and the miners' "trods" blocked up, and he would find his night-shift men all fast asleep in their beds, and quite right too. But I must confess further correspondence with anonymous writers. I hoped to get a few wrinkles from the readers and writers in the *Mining Journal*, but must confess to having been most grievously disappointed.

GEO. WM. DENYS.

NEWTON SAINT CYRES, DEVONSHIRE.

SIR.—Just a line to inform you that our parish is showing signs of improvement. First, a very comfortable and commodious schoolroom has lately been erected. Secondly, great credit is due to the Messrs. Sims for their spirited trial of the manganese mine. Here the ore is found in the red sandstone. It is very rich, and likely to be produced in large quantities under the deep adit. Thirdly, I wish to call the attention of capitalists to our valuable lead mine, situated in dark killas, because, judging from old reports, and from the fine specimens which have lately been raised from an old shaft, a small outlay would be the means of bringing a good deposit to light. Both the mines are not far from Exeter, and near a railway station. I am informed that about 30 years ago this parish was full of industrious miners, which made it a very lively village.

May 23.

E. T. MAY,
Vicar of Newton Saint Cyres, Devonshire.

A CALEDONIAN RAMBLE.

"Caledonia, bleak and wild,
Fit nurse for a poet child."—SCOTT.
SIR.—Last summer I had the honour to write you a lengthy article entitled "The Land of Burns;" I have again, I hope, the pleasure of placing before your readers a second sketch entitled "A Caledonian Ramble." Of all places that I have ever visited where the romantic could be calculated to inspire the soul, the territorial regions of bonny Scotland usurp the sway. I have travelled beyond the Canadian shores, and have listed to the mighty waters of the rolling Niagara; I have seen the redskin Indian in his wigwam in the Far West, I have sunned myself in gondolas beneath Italian skies—but Caldonia for beauty, for picture-queness, for grandeur and delight for me, for me. It is here where the kingly eagle builds his nest, and with majestic defiance beholds the monarch of the skies mounting in imperial splendour his gorgeous throne; it is here where the wintry blast sweeps across the mountain peaks, and where the great hero lay along the rocks, and recalling his wish to be in sunnier lands than his, blessed God he dwelt within the golden regions of luxury and liberty. It was here that Scott delighted in his luxurious writings, and Burns lay dreaming of Mary in Heaven.

But whilst I am depicting in somewhat poetic imagery this delightful country, I must not forget that I have a more matter-of-fact mission to accomplish in connection with your well-known paper, for which Journal this letter is expressly written, I must not cease to remember that it is to the recognised organ for mining speculations that I am writing, and that I need be both particular and concise in all I say.

Travelling through Elgin and approaching Lossiemouth—that lately discovered centre of the most valuable lead ore in Scotland—I came across a property about half-a-mile from the village and shipping port of Lossiemouth, where I found great facilities for loading and discharging are offered, and which adjoins the Great North of Scotland Railway Station. Having a hearty liking for all metalliferous operations, I was naturally struck with the sight of such value in what I at first thought so unkown a spot, but on walking along the Moray Firth I actually beheld ore in one continuous run cropping up even above the surface to the extent of half-a-mile, but on making careful enquiries I found the district was not so obsolete as I had anticipated, a private party of Liverpool gentlemen having, according to the manager's assurance, opened up extensive operations, and a shaft of 60 ft. was already sunk, the mine being known in that locality as the SOTFIELD MINE, near Lossiemouth, and receiving its name from an adjacent village. Making a friend of Capt. John Lobb, the manager, whom I found most willing to enlighten me on every subject, I am enabled after much research to place the following particulars before the readers of the *Mining Journal*.

In walking on the course of the lode anyone can see its richness, for several costeanning pits have been made for a distance of half-a-mile. There is a substantial engine with a 9-in. lift of pumps, which were cast by Messrs. Walker and Pendleton of Liverpool, expressly for the mine, and which work admirably, all uniting to show that the lessee contemplates sparing no expense to give the undertaking the most marked issue.

Referring to the lode again, it being, of course, that part of the whole on which success depends, I can confidently say that wherever it has been cut it has been found to be of the very richest quality, and piles of it may be seen in a large shed near the shaft, which have simply been accumulated through the proprietors testing their undertaking. I, for my part, wish these gentlemen much success. It is a source of great pleasure to me to behold the speculative industry of the British Isles, and to recommend any laudable speculation to

MAY 26, 1877.

your readers. With this purport in view, I have expressly addressed this epistle to your excellent Journal, and were it not that I am fearful of trespassing too greatly on your valuable space I would have added some further particulars, but reserving the more vital properties of the Stotfield Mine to a future letter.

C. ELLIS.

AN APPEAL TO MY COUSINS IN TOWN.

SIR.—At the annual meetings which are approaching of the Roman Gravels and Tankerville Mines I hope that some of our relations in town will cause a strict enquiry to be made into the management and accounts of both.

The Roman Gravels owed us four months' dividend, and by the Burry Port Smelting Company lost (the directors said so themselves) only one month's profits or returns—why have they not paid us the other three months? Especially as they assert, with apparent truth, there has been no falling off in the mine. However, they have not done so, but have taken a course which was sure to send down the works. They postponed the dividend two months longer without assigning any other reason than the loss by Burry Port.

The last annual report of the Tankerville Mine was most glowing. One director travelled 400 miles rather than lose so delightful a meeting. The mine was quite under control—never looked so well; the machinery first rate; the captain full of modesty, but covered with blushes and congratulations. He did not like to promise too much—he could not see through the ground; but 150 tons a month as before, certainly. He fully expected much more. Even the old workings were going to pay. There was (all agreed) a bright future for Tankerville.

True, the accounts looked shaky. The reserve was drawn on, unless memory deceives me. And, behold! suddenly—no dividend. The produce of the mine stated to be reduced one whole third. Everything the reverse of what the meeting had promised, and no hope of speedy improvement. No wonder the property in the Tankerville Mine is most seriously, and perhaps permanently, reduced in value.

So far as I can see or understand, the directors of these mines have taken the surest course to diminish the property of their shareholders. I shall be thankful to anyone who can set me right, if now wrong, for I am only—

A COUNTRY COUSIN.

PARYS MOUNTAIN, ANGLESEA.

SIR.—I have read with some considerable interest the letters of your correspondents in last week's Journal concerning this mine. Your correspondent, "Mine Investor," however is in error in calling a certain portion of the mine The Maria Mine. I presume he means, without doubt, The Mona Mine. I find another rich branch has been cut in the 90 cross-cut, which looks well for coming wealth of no ordinary sort. Of course any hour may now make up for loss of interest on capital, judging from the favourable reports issued risk is now reduced to a minimum. A great demand having arisen for shares in Parys Mountain since the last meeting the price has steadily advanced, a scarcity in supply having tended to stiffen the market, present holders being now unwilling to part with their valuable property. I note that Messrs. Watson Brothers, of 1. St. Michael's-alley, Cornhill, state their belief that an enormous rise in the price of these shares must take place when the intermediate lode (close at hand) in the 90 cross-cut is struck, and that they will approximate to par value on the assurance of the determination of the proprietors to raise more capital, by simply subscribing for shares in the valuable Morfaud property, a splendid investment, with immediate prospects of large dividends. A fact we may state already accomplished by resolutions and support given at the last meeting.

OCCASIONAL CORRESPONDENT.

PARYS MOUNTAIN.

SIR.—I am glad to see in last week's Journal that great expectations are formed of the ultimate success of this interesting property, and that it is now fully believed to be about to return to a position second to none in Wales. I should be glad to know when the next meeting takes place; or to obtain all information from some of your able correspondents as to the likelihood of the property again becoming so rich as spoken of in the various articles. It appears to me that a very small sum of money would drive the 90 cross-cut into the mass of ore expected, most sanguine hopes being entertained of success. The reports of Capt. Mitchell are now watched for with increasing interest, and any hour a telegram may bring the welcome news so anxiously expected. It would, therefore, appear that this mass of ore (from which flows the tale-telling stream of thick copper) may be won without the aid of more capital, at least we may reasonably believe that a good chance exists.

CORRESPONDENT.

CARDIGANSHIRE MINES, A.D. 1877—No. XVI.

SIR.—I promised in my last to commence my remarks on the old Ystymythen Mine, which is situate immediately to the west of the Aberystwith Mines, the same lodes running through both properties. Although this mine has been worked for centuries, and during the present one has returned vast quantities of lead ore, and being the only mine, with the exception of Cwmystwith, that smelted its ore in this county, at a place known as the "Smelting," and standing opposite to it, about $\frac{1}{2}$ mile west of the Devil's Bridge, the ore having been smelted with peat, which abounds in that neighbourhood, and of an excellent quality, the deepest workings have only reached a point of about 80 fms. above sea level, so that what may really be termed mining has not yet commenced, but may more accurately and appropriately be termed shallow adits and surface working. It is supplied with the most perfect dressing machinery yet erected in the Principality, and the only thing required is to extend a cross-cut north throughout the grant, to intersect the lodes standing wholly in that direction, and to deepen the workings, to make this a lasting and very profitable mine.

I shall next offer a few remarks on the Tynyfron Mine, to the west of old Ystymythen, and also having the same lodes running through it. It has lately been registered with a capital of 10,000*l.*, and more than ample working capital provided for the erection of all the necessary machinery and the proper development of the workings. Like the former property of which I have been treating, it has only been worked by shallow adit levels driven in from the side of the hill, about 80 fms. above the bed of the Rheidol. So far as the lode has been worked, it is one of the richest and most compact of any that have been opened on the great Ystymythen vein, which has been worked at surface for many miles in length. The piles of ore are now lying at surface awaiting the erection of the machinery (which will be driven by the River Rheidol, a water-course from it passing through the grant) is the finest pile of ore I have seen for some years, and to anyone who may wish for information or inspection, as wishing to put capital into a *bona fide* property, I should advise them to come and see it for themselves. There is a very large quantity of ore ground laid open above the adit, as well as a shaft sunk under it for 12 fms., the deepest point being the richest. Like old Ystymythen, a cross-cut should be extended north to cut all the lodes standing in that direction, and the mine deepened at the rate of 15 fms. annually. If this is adopted I shall not be surprised to find each 1*l.* share in less than two years selling at from 10*l.* to 15*l.* per share, and I fully believe that Tynyfron is destined to become one of the greatest mines ever yet worked in Cardiganshire.

Now, as we see that mining in this county is really beginning to make a start, let me offer a few general remarks as to their position and the probabilities of their success. I will first take the Cambrian Mining Company (Limited), which has been registered with a capital of 100,000*l.*, out of which, after paying the purchase-money, there is ample, and I may safely say more than twice the amount of working capital provided than is really necessary, or that will ever be required. These mines have already produced millions of pounds worth of silver-lead and other rich ores. The very deepest point yet seen in them is 100 fms. above sea level, whilst the adit I have recommended to be driven would pass through the grant and under these old workings 40 fms. deeper than the deepest point yet seen. This adit would have to be driven on the north lode, and when it

reached a point 250 fms. eastward from its mouth a cross-cut south 50 fms. would reach the great Esgair-hir lode, in entirely virgin ground, and I do not hesitate to predict that at this point a richer course of ore will be found deposited than has ever yet been worked on this magnificent vein, and that a property will be opened out that must continue immensely profitable for a century to come.

Next, a capital is to be raised for Cwm Erfin, which has just reached the sea level, and which has produced silver-lead ore to the extent of 700,000*l.* It is surrounded by mines that have been worked 80 fms. deeper, and have produced millions sterling, and what has been done here can only be accounted as surface scratchings. Short cross-cuts to lodes untried in the grant, and the deepening of the mine, must lead to a great success; it is an impossibility, humanly speaking, that it can be otherwise. In looking into matters, and going into calculations as to what was (say) 20 years ago, and what is now, I find that had the last company erected a stone-breaker, and applied Mr. Green's self-acting dressing apparatus, a saving of some 800*l.* would have been effected in cleansing the ore, whilst a saving of 10 per cent. of the ore washed away, which is within the mark, would have added to the profits divided above 17,000*l.* more, so that these two items alone would have added 25,000*l.* to the dividends. Of this and other matters, more as I proceed.

Gwynin, Aberystwith, May 22. ABSALOM FRANCIS.

MAP OF CARDIGANSHIRE.

SIR.—It seems strange, and is a great pity, one cannot get a good reliable Map of the Cardiganshire Lead Mining District, on a scale of (say) five chains to an inch. Such a one, though small, would, if well constructed, be very useful. Capt. Francis has written a book about the mines, but this is very little use without a map in similar terms. He says he has surveyed nearly all those mines; surely it would be well worth his while to publish such a map as I speak of. May 23.

WALLER.

CORNISH MINING.

SIR.—In endeavouring to point out to the enterprising public mines which I consider to be as free from risk as such properties can possibly be, such opinions being based on practical experience and observation, due regard is also given to the judgment of parties under whose supervision the operations are carried on. There are many mines known to the writer, from want of proper management, which have been abandoned as being unproductive ground, taken up again, reworked under the supervision of persons better qualified to carry out such operations, and attended with great success. Wheal Compton is a case in point, where at the adit level a cross-cut was driven on the cross-course, carrying only a part of it, the consequence being that the discovery recently made was missed by the former workers, to the advantage of the present proprietary. I am pleased to say this discovery is likely to lead to results equalled only by its rich neighbours, Tresavean and others, in the well-known Gwennap district. Some two months since the shares might have been purchased for a few shillings per share, while they are now sought after at so many pounds. This is the pioneer mine to several in a similar position, selling now for less than one-half the value of machinery on such mines. The present is, therefore, most assuredly a good time for the investor to make the necessary enquiries into the real state and prospects of the different mines, so as to make a selection as shall tend to his best-fit, the risk being insignificant compared to the probabilities of success attending such small outlay.

St. Day, Cornwall, May 23. CHARLES BAWDEN.

CAPT. TREGAY, AND PEDN-AN-DREA MINE.

SIR.—"Argus" maintains his predilection for fiction. He says—"W. X." starts off as though the balance-sheet from 1875 had left a clean book, but this is far from the reality. The company's balance-sheets, in the printed and published circular to the shareholders from 1875, show liabilities a "total of 8490*l.* 16s. 1d.;" and he adds "so that clearly, on a call being then made of 7015*l.* 19s. 7d., a clean balance of 1475*l.* 10s. would be left against the company, instead of 1091*l.* 6s. 7d. in its favour." Here is the *suggestio falsi* and the *suppresso veri* with vengeance. "From 1875" would naturally mean from the end of that year, but it should be from only May 14, 1875. Then, again, "Argus" gives the *gross* liabilities at that date, and forgets the other side of the account. He and his client (Tregay) may labour to show that the accounts of their company were wrong, but all that I have to do with is that the official balance sheet, issued in June, 1875, states in exact figures the *debit balance* to be 592*l.* 13*s.*, and the call then made amounted (as by the subsequent balance-sheet) to 7015*l.* 19s. 7d., leaving a credit balance of 1091*l.* 6s. 7d. to start with from May, 1875. The total debit balances in working the mine from May, 1875, to Aug. 4, 1876, after allowing all calls as good, amounted by the official accounts to 16,357*l.* 18s. 4*d.*, and the calls made in the same period to 15,800*l.* If "Argus" intends to allege that the company issued fictitious accounts let him say so clearly, and at the same time explain why nearly 16,000*l.* was called for from the pockets of the shareholders in the last fourteen months of the late company.

"Argus," as usual, does what he can to distract attention from the real point. He now says that of the 100,000*l.* lost by the late company 31,741*l.* was gone before Capt. Tregay entered their service. Here he stops short, and thinks he has given a complete and triumphant reply to my enquiry. But why does he not go on to answer the question so often asked, and explain how it is that the remaining 65,000*l.* was lost under Capt. Tregay's management for the late company, with a much higher price for tin, when in a few months' working the mine for himself, and with considerably lower prices for the returns, he is able to make good profits? (if this be true, as reported). No matter whether the loss made by Capt. Tregay was 100,000*l.* or 65,000*l.* the latter sum is quite large enough to make an explanation important, and we have the advantage of at last an admission to that extent. Of course, if Capt. Tregay is not making profits by the working of the mine it is very easy to say so, and the answer would be conclusive. Why beat about the bush on the subject? In a former letter I showed that the average monthly quantity of tin sold in the last year of the late company was about 20 tons, and the average monthly cost for same time was 1850*l.*, though Capt. Tregay had reported considerable reduction in the expenditure. I also pointed out that the sale of tin for March this year, as officially reported in your Journal, was 40 tons 16 cwt., for 1784*l.* 5s. 3*d.*, so that it was difficult to see a profit, even if it cost the same to return the larger quantity as the smaller, unless, indeed, they are what is called "picking the eyes out." When I am told by Capt. Tregay's advocates that I refrain from making any statements as much as possible, it shows how much they disregard facts even when repeated.

With respect to the mare's nest of a balance-sheet in February, 1876, Mr. Sharp pointed out that at the meeting that month the then secretary, the books, and the accounts were all absent, and that another meeting was ordered to be held the following month. In March a balance-sheet was presented, which included a complete account from May, 1875, to February, 1876, showing a debit balance of 11,002*l.* 17*s.* Does "Argus" mean to say that this loss was made in one month?—May 21. W. X.

CAPTAIN TREGAY, AND HIS ACCUSERS.

SIR.—I have glanced over all the letters which have emanated from Mr. Granville Sharp, "W. X.", and others through the Journal with reference to Pedn-an-drea Consols, which show a wicked animus. Those writers wish to make it appear (but they cannot) that Capt. Tregay acted dishonourably towards the late company by concealing the actual state of the mine. Is it not true that Capt. Tregay entreated the late company not to let the mine get into other hands, and that they would not take his advice? If he wished to take an undue advantage over them is it to be supposed that he would have urged them to retain their interest in the mine? He bought the mine and machinery at a price beyond the offer of anyone else, if, indeed, any other offer was made; and I admit he had a good bargain, and I am glad for it, but the opportunity to buy was open to other people. It was not a hole-and-corner transaction. I am told that not a single member of the late company complain in

the matter; they appear satisfied with what was done, although rich discoveries have been made since the property came into Capt. Tregay's hands, a circumstance upon which I congratulate him. I would say to these busybodies in other men's matters "Study to be quiet, and to mind your own business."

Hotel, Redruth, May 23.

MINING IN GWENNAP—WEST TRESAVEAN MINE.

SIR.—Those persons who think the mineral resources of Gwennap are exhausted are invited to pay a visit to West Tresavean, which is situate in proximity to the celebrated Tresavean Mine, of famous memory. I was at this mine on Tuesday, when I met several gentlemen who came there to see the tinstone raised from a lode called, after the name of the manager, Parkyn's lode. The tin-stone, a large heap of which is lying near the whim-shaft called about 40 fms. deep at that shaft. The lode is very wide—about 5 or 6 ft., and the whole of its contents is fit for the stamping mill. The percentage of tin in the stone is unusually high, so that the discovery is a rare one, and likely to yield considerable profit to the company after the reduction appliances shall have been in operation a reasonable time. The quantity of tin-stone is said to be practically inexhaustible; the reserves extending from the adit to the surface (40 fms.), and to an unknown depth, from the eastern to the western extremities of the sett. This lode, and Capt. Dick William's lode a few fathoms south, are embedded in a great elvan dyke which, in Comford sett adjoining, has been worked for its stanniferous yield in ancient times. In front of Mr. A. Pryor's dwelling house at Bell Veor is a very wide excavation made by the ancients on that dyke for the extraction of the tin it contained. It has also been operated on in old Penstruthal sett; but the works in West Tresavean will be confined to the lode, which are numerous. There is Penstruthal main lode, which yielded in that mine 60,000*l.* profit in one year. This is a copper lode, and of course will receive the company's early attention; but just now a quick return of tin in large quantities will give early dividends if the works are prosecuted with that vigour which is warranted by the character of the lodes, and especially that of Parkyn's lode. I would advise all possible expedition in the metallurgical preparations, and as immense quantities of tin will have to be conveyed to the stamps, I submit to the manager whether it would not be well to lay down a tramway from Michell's shaft to the stamps. The steam-engine for the stamps being *in situ*, a short time only is requisite for the completion of the appendages requisite for returning to the surface. Although the price of tin is low the company can make up for that in quantity.

The other lodes—south lode, Gobban's lode, &c.—are well defined (some of them) by the deep backings by the old men, who have left the moderns to pursue them in depth. By their workings they just say—"Here are the lodes, try for yourselves." The rich discovery said to have been made in Comford Mine, which I have not seen, is very important for the district, as it, and the discovery in West Tresavean, may lead to a re-opening of some mines in the locality, which deserve further development, and of others in the vast area of undeveloped ground in the immediate neighbourhood. The exact course of Comford lode, on which the rich discovery has been made, I know not, but I am told that it runs into West Tresavean.

Truro, May 24.

R. SYMONS, C. and M.E.

LANNER VALLEY.

SIR.—In my letter inserted in the Journal last Saturday week I omitted several items of information relative to the Valley of Lanner, *alias* Lannarth, in Gwennap. When the mines in Gwennap were in full operation—say, 30 years ago—there lived in and on the sides of Lanner village no less than 27 mine agents; at the present time there are not, perhaps, half a dozen. Many of the old agents are resting in Gwennap churchyard; some are gone abroad; very few, if any, remain in the county; and all the mines conducted by them are as silent as the grave. Capt. Wm. Martin, late of Burncoose, in Stithians (now the property of Mr. J. M. Williams), was at that time a man of great note—an authority in mining affairs. He was considered a good miner—but he was made so by the Tresavean Mine's success. But for that success he would have remained in the ranks of ordinary agents. "A good lad makes a good cap'n." Capt. Martin was the manager, under Capt. T. Teague, of Tresavean Mine, and of, I believe, some others; and he was a great reporter on mines, in request, like the late Capt. Charles Thomas, for reporting. I remember a narrow escape from death which he and a miner had in a shaft, either in Bell Mine (now West Tresavean) or in Comford Mine. They went down over a ladder in a shaft which contained a few fathoms of water. The ladder stays gave way under their weight, and fell to the bottom through the water, taking them with it. They rose to the surface taking hold of the other when he came up, almost breathless. The Captain was a notorious tippler, a habit which frequently brought him into danger and extravagance, and of course into disgrace. But late in life, his means having fallen off, he became more steady. When his last illness came he said, "Now I know I shall die;" and so he did. He was, I think, about 80 years old. All the other agents are also dead. What sumptuous dinners they used to have there! At Penstruthal, which was managed by Capt. Wm. Michell, they also fared in like manner. A ludicrous anecdote may be mentioned in relation to two of the Penstruthal agents in the first working (1830). Capts. A. and B., as I will call them, were too intimate with the account-house girl, a rosy-faced creature; but of course one agent was not aware of the other's proceedings. When Capt. B. found that issue would soon result he agreed to marry the girl, but before he could go to church the increase appeared. He must needs, therefore, wait the convalescence of the mother. When that time arrived, A. having learned that B. was going to marry her, wrote him the following note: "My dear Sir,—Don't marry Jane, for everybody says that the child is exactly like me!" Capt. B.'s eyes were opened, and, seated upon a tidal rock, the girl thereupon went to Falmouth, and, seated upon a tidal rock, was waiting the coming tide to wash her off; but someone rescued her from suicide.

There are several nice residences on the valley's sides. Capt. Olgars, near Lanner village, has a neat place there, consisting of a good house, gardens, and numerous inclosures of good land. The late residence of Mr. W. H. Tregoning, the rich tin smelter, tippler, &c., deceased, is now occupied by Mr. Wicket, the managing clerk in Burncoose copper office. Penponds, near Trevorth village, is, I believe, occupied by a Mr. Jose, a retired gentleman. Treviskie, Penventon, and some other houses are decent residences. Burncoose, late the residence of Mr. J. Williams, is now the property of Mr. J. M. Williams; this is south of the valley. At Lanner village is the villa residence of Mr. Treiwolla, a respectable retired Falmouth merchant, living in great comfort, amusing himself by gardening, &c. He is the owner of the Royal Hotel and other property at Falmouth and elsewhere. Trevincle House (Mr. E. B. Beauchamp) I mentioned in my last, also Trevorth House and school.

When I visited Lanner in my tour 40 years ago there were numerous water stamping mills and stamp plots, the sites of which are now occupied by houses and gardens in that village. It is alleged that the discovery of copper ore at Comford Mine is not a myth, but something really valuable, and likely to be lasting. I hear also that the tin lode at West Tresavean is one of the best discoveries of tin ever made in Gwennap district within living memory. The agents are in high spirits about it; Comford and West Tresavean are contiguous mines. It is a remarkable coincidence that the discoveries at the two mines were nearly coincident as to time. It is not improbable that these discoveries will lead to a revival of mining in the district; if so, Mr. Peter, of Redruth (the owner of Comford and Tresavean Mines), and Capt. T. Parkyn, of Roche (the manager of West Tresavean) will deserve testimonials of intrinsic value. Capt. Curtis, the mineral agent of Mr. J. J. Rogers, visited the mines yesterday, and is greatly pleased with their state. Mr. J. M. Williams also visited the West Tresavean Mine last week; from which it is to be inferred that the mines are attracting the notice of non-shareholders. As I am making a tour through all the Cornish mining districts I purpose to send you some scraps of information

MAY 26. 1877.]

SUPPLEMENT TO THE MINING JOURNAL.

573

as to their state and prospects. Carnmarth, on the northern side of Lanner valley, is about 700 ft. above sea level. A TOURIST.
Hotel, Redruth, May 23.

MONYDD GORDDU LEAD MINE.

Sir.—A few days ago I heard a rumour that the ore had cut out in the 24 in this mine; and as I could not understand so sudden a collapse from such a splendidly strong lode, I thought I would give them a look-up, and am pleased to say that, although the big course of ore has not continued its regular course east and west, they have cut into a fine course of ore going diagonally across at this point on a north-westerly course, and looking very strong, being worth I should say from 40l. to 50l. per fathom. The change of course may be owing to the influence of the junction of the south lode here, which has split up the main lode, but I am more inclined to think it is a counter lode, as three or four lodes intersect about here. If this be the case it further bears me out in my suggestion to throw out a cross-cut to the north lode, which can be done for under 100l. cost, and will, I believe, open up another rich mine; I say another, as whatever the 24 may turn out at the big lode the lower levels are safe for masses of ore, as scores of tons of water have been welling up stained with the oxides, such as they cut a few weeks since, clearly showing that immense bodies of lead will be found holding down, therefore I earnestly advise going for the north lode, and sinking as rapidly as possible.

CAPTAIN JACK.

Aberystwith, May 24.

INVESTMENTS IN LEAD MINES.

Sir.—You kindly inserted a letter from me a considerable time ago on the position and prospects of the Bodidris Lead Mine. I am happy to inform you that the good opinion of the property which I then formed has been more than verified. Very recently excellent discoveries have been made, which prove this group of mines to be richer in lead than the most sanguine supporters of it anticipated. It is now evident that its wealth is vast, and that it must rank with the best lead-bearing properties in Wales. It is now on the eve of becoming a dividend-paying mine, but the directors are in no hurry to secure the name of its being so, but so to work upon the discoveries made as to make it become so with *caut*. They desire to prosecute the labour which has been so successful, and to secure good reserves of ore, which is rich in quality, resembling that of the Minera and Old Westminster. I can dispose of shares at a price which leaves a large margin for profit, and as the price of the shares will now rapidly run up, it will be prudent on the part of investors to come in at once and be ready "to pluck the pear when it is ripe," which is so nearly the case. The value of shares in lead mines is advancing and must advance as the consumption and waste of war is great, and of the present war the waste has been prodigious. Never were the munitions of war more recklessly scattered, and the plains of European Turkey and Asia Minor are being strewed with British lead and British steel, as well as British and foreign copper.

The Denbighshire Consolidated Lead Mining Company is now working a most valuable property. No one can read the reports made, on the most accredited testimony and authority, of the operations which have been conducted, and the prospects now opened up, without a profound conviction of the great success which this speculation destined to attain. A remark of the Chairman at the last general meeting is worthy of notice in all mining operations—"It is unfortunate that we do not get all our successes at once." There is a vein of satirical sarcasm in this sentence which investors should ponder, for the desperate impatience of investors to obtain dividends has ruined many mines, by forcing the directors to impulsive measures, and obstructing the most politic plans of opening up properties for the benefit of all concerned. One of the shareholders sent a gentleman to inspect the mine, who made this report—"I consider that you have done a great deal of work, and that you are quite right in shadowing forth a glorious future for the adventure. The grand point in the mine is the north cross cut, that cross cut will intersect lodes that will do more for you than anything else." The expenses of working here have been heavy, and various unexpected obstructions have been met with, but every step proved the indisputable riches of the mine and the brilliant prospects in view. The sett covers nearly a square mile, and was formerly worked under various grants by independent capitalists. The consolidation of all these interests by the present company has opened up a new era for the property, and the deeper it is worked the more productive it becomes. The works are now in a very advanced position and ore is returned, and the period is not remote when dividends will be paid.

A proof of its ultimate productiveness it may be mentioned that parallel crevices run through the great Mass-y-Saint, which years ago returned 300,000oz. The capital is 30,000l., in 10,000 shares, 2/- fully paid up, and can be bought at par. A gentleman well acquainted with the mining peculiarities of this profile district wrote of this mine—"A purchaser may calculate on finding his investment is increased in value 50 per cent., and may rely on a 15 per cent. dividend."

Our advice to our clients is to buy while the market is quiet, as the period is at hand when shares in this mine will run up to fabulous prices. I have shares to dispose of at par, and recommend my clients and investors generally to secure an interest in such an excellent prospective property.

JOSEPH J. REYNOLDS.

Finsbury Place, London, May 24.

THE WILD DUCK, OR SPORTSMAN'S ARMS.

"Look here, soe," says Jemmy Dowa, "I forgot in our last meeting to tell ee about an old bal I seed's in my last journey near South Town, caaled 'Wheal Clarence,' and Jan Tenby will tell ee how a got that name?" "Iss, I can," says Jan, "but let me think a bit. Is, sure, it must be 50 or 51 years ago. I was a young, hardy chap working upon tribute in Dolcoath. Well, we had a run of good speed for a long time, and used to throw together with a pare working tin in the 'bottom of the hill district.' Some say the used to prill the samples, but I don't know nothing about that; one of them was the faither of some of the most noted managers of mines of this day. We had a good pay-day and a good dinner and a good pint up to 'Pendarves Arms,' and in the evenen we heerd that Capt. —— was going to start next day for Lunnon. It took two nights and a day then to get there by mail coach from Pearce's Hotel in Truro. So my comrade said 'I'll ask Capt. —— if I shall go with him.' It was soon settled over a glass of toddy, and off the went sure enuf next day. My comrade went away a tributer and came back a capn, and hen a capn and manager of mines ever sence, an' twas he—Capn W—who told me how Wheal Clarence got the name. It was like this here. When the got to Lunnon the put up at the 'Bell and Crown'—as well as I can mind—in Holborn, and there the mit Capn Joe Odgers, who was just going off to Greenwich. Capn Joe was a fine-looking man then, dressed in black, with breeches and black silk stockings. 'God bless my soul!' says Capn Joe 'I'm fine and glad to see ee, but can't stop now, as I have to meet the Duke of Clarence and lots of gentlemen in Greenwich, and I think that I shall get them to take shares in a little bal I have in Cornwall, for,' says Capn Joe, touching his pockets, 'I have some beautiful prills of ore here; but you be sure to be here to-night and I'll tell you how I got on.' So the all met after Capn Joe come back, and Capn Joe said, 'I can tell ee, Capn ——, that this was the grandest day of my life. The Duke of Clarence is now Lord High Admiral of England. There was lots of admirals there and other officers, and after the levee was over I was introduced by the Duke's private secretary (you see, Capt. ——, I'm a High Mason, which accounts for all this). So the Duke began to chat as free as you could, and wanted to know in what part of Cornwall the mine was, and was it tin or copper, 'for,' says he, 'many years ago when my ship was in Falmouth I visited Truro, and also a rich copper mine on the north coast called Wheal Townan. I recollect it perfectly well,' says the Duke. 'My mine, I told the Duke, was on the same lodes as Wheal Townan, a little further west, and taking out my prills, said it was likely to be so rich as Wheal Townan, and when the Duke and the other officers saw the prills they all said at once they would take a certain number of shares, and I promised that as the mine was on the same lodes as the best copper mine in Cornwall that it should be called Wheal Clarence. They all said that it was a capital idea, and laughed heartily. The best proof, Capn ——, says Capn Joe, 'of my day's work is this,' taking out a roll of Bank notes. 'I was exalted,' says Capn Joe, 'in dignity high amongst princes and nobles; and now we'll have the best bottle of wine the 'Bell and Crown' can produce.' This is how," says Jan Tenby. "Wheal Clarence was christened."

"And a very good account it is," says Uncle Henry Treylon. "You have it," says Jan Tenby, "exactly as it was told to me by my old comrade (now Capn. W——) on his return from Lunnon, and I bleve 'tis so true as we are sitting in this here room." "But are all the stories true," says Jan Jewill, "we have heard about Capt. Joe Odgers?" "By no means," says Cousin Will. "I knew him intimately, and scores of things are attributed to him he knew nothing about. Capt. Joe was one of the first Cornish captains who went to London to sell a bal, but greater fools, and very many bigger —g—s, than him have gone there since on the same errand." "But was he ever a captain?" says Jan Jewill. "To be sure he was," says Cousin Will. "When a young man he was appointed agent in

Dolcoath Mine, and might have remained there to the end of his days, being an able, efficient, and practical miner, but something occurred to his comrade, Capt. J. V., who was dismissed, and because the adventurers at Capt. Joe's earnest request would not reinstate him he resigned his situation. Capt. Joe when a young man was for years a local preacher, and his brother, the late Rev. James Odgers, was a well-known Wesleyan minister. Another brother, the late Capt. T. Odgers, was a tin buyer and captain dresser at Stray Park Mine. Capt. Joe had several shares in Tresavean Mine, and having borrowed a small amount of money upon them, and being careless as to the receipt he signed, was never able to get his shares again." "But was there any truth," says Jemmy Dowa, "about the 'Halter Pie'?" "I believe," says Cousin Will, "it was quite true, and the following is the account I got from Capt. Joe's own lips:—Capt. Joe happened to be in London, and several more Cornishmen to whom he had shown great kindnesses, and introduced them to men of capital, and by way of evincing their gratitude for past favours they determined to play a practical joke. Capt. Joe occupied a private sitting room, and when the 'Halter Pie,' with other things, was introduced for Capt. Joe's dinner it was arranged that his Cornish friends (?) should occupy the opposite room, and that the door of Capt. Joe's room should be left sufficiently open for Cruikshank to sketch the scene. Capt. Joe, however, had a hint, and pretended nothing. He sat down to dinner very quietly, and after a time, as if looking for something, he rose up and caught hold of Cruikshank and threw him over stairs and broke his arm, and only that the party in the opposite room had bolted the door they would have gone over stairs faster than they came up." "I knowed Capt. Joe very well," says Old Tom, "and when a wot in his prime he could throw half-a-dozen men over stairs without any trouble. But what do ee say sose about dry dressing or wet dressing? Now, look here, take 21 ton of dredge—say two-thirds is waste. Well, spall or cob out the waste as clean as possible, and you'll have 7 ton of ore left; crush it dry, and you know what you have. Crush or stamp 21 ton of the same sort of dredge, and jig or budle it afterwards, or do what you mind to it, tell ee for certain men that you'll never get 7 ton of ore out ov it worth never so much as my 7 ton of dry ore, for if you caan't separate the ore in the stone to a great extent you'll never separate it when it is dust, and the more you jig and budle the more you lose."—Cousin Jack's Unpublished MSS.

THE MINERAL RESOURCES OF CANADA.

Although there is no official record of the progress of mining in Canada, a very ample substitute has for the past ten years been kept up by Mr. ROBERT BELL, C.E., F.G.S., of the Geological Survey of Canada, and to whom we are indebted for the exhaustive review for 1876, of which we are now enabled to give an abstract. Commencing with GOLD, Mr. Bell states that there has been a considerable falling off in the yield for the year, which is partly due to the loss of a considerable number of miners wrecked last autumn on a voyage from Victoria to San Francisco. Although Cassiar has produced the largest quantity, the Cariboo district still holds out well. In the latter a small stamp-mill has been erected to test the numerous auriferous quartz veins which have been discovered. The Kootenay and Ominec districts have been almost deserted. The official report of the Minister of Mines gives the known exports at \$1,339,986, which, including the quantity taken away by private hands, would make the total yield \$1,786,648, against \$2,474,904 for 1875 calculated in the same way. On the North Saskatchewan the low water during the summer favoured gold washing, which was carried on to a small extent as in previous years. No progress has been made in the development of any of the gold regions around Lake Superior. Besides the numerous veins occurring in the country north and west of this lake which have been found on assay to contain the precious metal, nuggety gold exists in quartz leads at the Jackfish Lake and Partridge Lake locations, and at Victoria Cape, opposite the Slate Islands. A vein at the last-mentioned locality, which varies from 1½ to 3½ ft. in thickness, was found by Dr. Harrington, of the Geological Survey, to yield 4 dwts. of gold and 5½ ozs. of silver to the ton. In the Hastings region some mining and prospecting have been done, especially in the township of Kaladar, but the exact yield is not known. As to gold mining in Quebec, Mr. Rivard, the Inspector of Gold Mines for that province, informs him that—"It was only during the last months of 1876 that preparatory works were commenced on the River Famine, in the township of Wotford, by Mr. Reese, and on the River Gilbert, in the seigniory of Rigaud Vandreuil, by the Gilbert and Chaudiere Gold Fields Company, the St. Onge Company, and likewise a few other miners. The St. Onge Company alone has commenced to mine in the superficial gravel, and to extract gold. During about two months and a half (in October, November, and December) they employed 20 men, and washed about 70 ozs. of gold. In the St. Francis division auriferous deposits have been discovered in several places, notably on the River Ditton, in the county of Compton, where the Hon. Mr. Pope has carried on exploratory works on his own land for several years. Several parties of miners have, in the course of the past year, made explorations in Chesham, Emberton (formerly the south half of Ditton) Ditton, and other townships in the county of Compton, and they report having found undoubted indications of the existence of the precious metal." The report of the Commissioners of Mines of Nova Scotia again shows an improvement in the yield of gold, the amount obtained in 1876 having been 12,039 ozs., against 11,208 ozs. in 1875, an increase of 831 ozs. The average value of Nova Scotia smelted gold is given in the report at \$19.22 per oz., so that the above amount would be worth \$231,389.59. The average number of men employed in gold mining was 371, and the yield per ton of quartz crushed was 15 dwts. 13 grs., against 15 dwts. 4 grs. in 1875.

The Lake Superior is the only region in the Dominion in which SILVER mines have been worked during the year. The Duncan Mine has continued to improve. About \$35,000 worth of ore were ready for shipment in the autumn, and a considerable quantity had been sent off earlier in the season. A stamp mill was erected under the direction of Prof. W. O. Courtis, the skilful manager of the mine, which is said to have been producing from \$4000 to \$8000 worth of silver a month during part of the winter. Very rich ore is said to have been struck lately in the central shaft at a depth of about 360 ft. Col. Wilson has continued the operations with a small force of men at the 17 K Mine. Promising discoveries of silver veins have been made near Pigeon river by Messrs. W. A. Kindred and Brother, who have sunk a shaft to a depth of 40 ft. at a place called Elizabeth, 1½ miles north of the American boundary. A large quantity of land has been taken up in the neighbourhood, and some of the owners had commenced prospecting towards the end of the season. The Silver Islet has amalgamated with the Ontario Mineral Lands Company with a united capital of \$1,000,000, and the large stamp mill is said to have produced between \$300,000 and \$400,000 worth of silver, but the amount has not been officially stated. The boring with the diamond drill was to have been continued during the winter until an additional depth of 400 ft. (or 1400 in all) had been tested: 18 miners have been employed. At the Little Pic Silver lode, Mr. Peter McKellar carried on work with a party of miners during the summer, and produced a quantity of valuable silver ore, principally in the form of argentiferous galena. Mr. A. F. Aurere continued his fishing and mining operations at the Slate Islands. The silver ore reported to have been discovered at Thirty-one Mile Lake, 60 miles up the Gatineau river, Mr. Vennor says proved to be partly silvery mica schist, and partly iron pyrites in a greenish hornblende rock.

A rich vein of COPPER ore, 4 ft. in width, has been discovered 2½ miles from Salmon Arm, Jarvis Inlet, in British Columbia, and an adit has already been driven a short distance on its course. The Quebec and Lake Superior Association's mine is now considered by the owners to be sufficiently proved to justify the erection of a 50-stamp mill. The West Canada Company has gone into liquidation. These mines were in operation for 30 years—from 1847 to 1876—and produced copper to a total value of about \$3,300,000. In the province of Quebec, the Canadian Copper and Sulphur Company reopened the old Acton Mine, in May, under the management of Capt. Richards. New engines and machinery were erected, the mine

drained and cleaned out, and a considerable quantity of ore has been raised from the old open workings. Some mining has also been done in No. 5 shaft, and rich ore has been struck in this part of the mine, which now (April, 1877) looks exceedingly promising. It is difficult to estimate the total quantity of marketable material raised, as none of the ore has yet been crushed or shipped. Seventy men, on an average, have been employed. Miners' wages have been \$1.25, and labourers' 70 cents per day. About 750 tons have been treated by the Longmaid wet process. The mine was opened in 1865, and up to last year had produced upwards of \$1,000,000 worth of copper. At the Huntington, in the latter part of the year, the mine was producing 350 tons of ore per month, and giving employment to about 60 miners and 40 surface men. Six out of the original nine furnaces damaged by fire in 1875 have been restored, and new vats have been built for reducing the ore by the wet method. The burners are 6 ft. high, 3 ft. wide at the top, and 1½ ft. at the base. They are worked continuously. It is now proposed to smelt the ore in two cupola furnaces by means of gas made from wood deprived of its moisture by Loudon's process. The Harvey Hill Mine continued to be worked, but on a very small scale.

In New Brunswick a small vein was worked on Simpson's Island, in Passamaquoddy Bay. In Nova Scotia 45 tons of ore were produced, principally as the result of prospecting in the neighbourhood of Polson's and Lochaber Lakes, in Antigonish county.

The copper mines at Tilt Cove and Betts' Cove, Newfoundland, now rank among the first in the world, as may be judged from the fact that out of 37,191 tons of ore received at Swansea, the great copper market of Britain, during the last six months of 1876, no less than 20,763 tons came from these two mines. Tilt Cove sent 6031 tons, and Betts' Cove 14,732 tons. I have not at hand a record of the shipments for the first half of the year, but they are believed to be considerably less than for the last six months. The mine at Betts' Cove, which is only six miles south of Tilt Cove, is worked under the personal superintendence of Mr. Ellershausen, one of the proprietors, with a force of about 500 men, of whom 340 are employed about the mine itself, and 160 at other work in connection with it. The ore of both these consists of pyrites, in which the proportion of copper varies between about 7 and 16 per cent. Other deposits of copper ore are known in the same part of the island, and it is proposed to work two or three of them during the coming sea-on.

With regard to LEAD, it appears that a promising vein of galena has been opened at a point situated about 7 miles due north of the mouth of Garden river, near Sault Ste. Marie. The ore occurs in veins in a belt of soft, glossy green schist, 36 ft. in width, running north north-west, and encased in massive fine-grained syenite. The principal vein is on the east side of this belt, and consists of solid ore, varying from 5 to 19 in. in thickness. Another vein of galena and quartz, near the west side of the schist, is 10 in. thick, but the whole width of the belt is more or less intermixed with small veins of galena. Shafts have been sunk on the larger veins, each to a depth of 15 feet. The galena contains a small proportion of silver, and is mixed with more or less zinc-blende. The work of developing the Frontenac Lead Mine, in the township of Loughborough, behind Kingston, has been continued during the year by the Frontenac Lead Mining Company of London. The vein averages 12 ft. wide, and continues to improve in depth to the westward, where it is worth 2 tons of galena per fathom. The portion hitherto worked is in gneiss rock, but when the intersection of the limestone band under the swamp is reached it is believed that it will prove extremely rich. The continuation of the vein beyond this swamp shows a good proportion of ore. A vein of argentiferous galena was worked during the year in the township of Barrie, but particulars have not come to hand. In Nova Scotia prospecting for lead was carried on at Caledonia, in Guysborough County, and about 5 tons of the ore obtained were sent to England for sale. A sample of the galena of Little Whale river, on the east coast of Hudson's Bay, has been found by Dr. Harrington to contain over 5 cwt. of silver in the ton of 18 cwt. of ore.

Owing to the low prices prevailing, very little IRON has been mined either in Ontario or Quebec. At Marmora a successful experiment has been made in smelting the ore of the "Big Bed," Belmont, by means of petroleum. Arrangements are being made for working several of the iron deposits north of Belleville as soon as the Grand Junction and North Hastings Railway is in operation. The Glendower Iron Mine, in the south west corner of Bedford, has been worked by from 10 to 20 men, and has produced about 2000 tons of ore, worth \$5.50 per ton, delivered in the United States. At the Macfarlane Mine, near the last, 320 tons of similar ore has been raised and shipped to Messrs. Pierce, Kelly, and Co., of Sharpsville, Pa., who are much pleased with its quality, and have ordered a further supply. Even the low price of \$5.50 per ton at Cleveland left a small margin of profit. The agent of Messrs. Sanderson Brothers, of Sheffield, who are about to establish steelworks at Syracuse, New York, reports the Bedford ores to be the best on the Continent for their purpose. Operations have been suspended during the year at all the iron mines in the Ottawa Valley. In the Province of Quebec, the St. Maurice and L'Islet forges, near three Rivers, have produced about 1900 tons of metal between them. The Radnor forge commenced running again in the early part of 1877. The St. Francis forge, at Riviere aux Vaches, is said to have produced nearly 1000 tons of iron during 1876. It is stated that an attempt to smelt the titaniferous ore of St. Urbain, Baie St. Paul, is again to be made under the direction of Mr. Pirie, an experienced engineer from Belgium, by means of a process by which the cost will be only a little greater than that for the reduction of ordinary magnetic ore. In Nova Scotia, besides some prospecting in Pictou county, iron mining and smelting have been confined to the operations of the Steel Company of Canada, at Londonderry, in Colchester county. The return made by this company to the Commissioner of Mines shows that in 1876 they raised 15,274 tons of ore, and employed 72 miners and 87 mechanics, labourers, and boys, about their mines. But little smelting was done, as their old charcoal furnace was blown out in the spring, and the new coke blast-furnace was not completed until late in the year. It may be here mentioned that an analysis of the brown hematite from the large deposit which I found below the last portage of the Mattagami river, or main trunk of the Moose, which was made by Mr. Hoffman, shows 52.42 per cent. of metallic iron.

During 1876 the quantity of COAL produced and sold by the Vancouver Island Collieries was 140,185 tons, against 110,145 tons in the preceding year. The seams of the Vancouver Coal Company which had been lost by a fault were recovered by boring during the year. At the Harewood Mine the elevated wire tramway has been got into operation since the close of the year. The seams worked in the island were—Vancouver Coal Company, two seams, 6 and 3 ft. respectively; Departure Bay (Wellington Company), one seam, 9 ft. 6 in.; Ilwacoo Mine, one seam, between 5 and 6 ft.; Union Mine, one seam, 10 ft.; Bayne's Sound Company, two seams, 6 ft. and 5 ft. 10 in. respectively. The coal beds of the upper part of the North Saskatchewan are beginning to attract attention, and Mr. Moberley proposes bringing a trial shipment to Manitoba during the coming summer. The Nova Scotian coal trade has further declined in the year 1876—the output from 781,165 tons to 709,646 tons, and the sales from 706,795 tons to 631,207 tons. The production of ALBERTITE in New Brunswick has increased at the rate of about 1000 tons per year since 1872, when it was only 5000 tons, to about 9000 tons in 1876, or an average output of 180 tons per week. The mine is now 1260 ft. deep, but the vein at the bottom is only 4 or 5 ft. thick, and sometimes pinches to a few inches, whereas in one part which is now worked out it is 17 ft. thick. The Elgin Company were boring for the Albertite mineral during the year on location to the west of the above mine, and the Belliveau Albertite and Oil Company have been prospecting to the eastward of it.

The deposits of MINERAL PHOSPHATES OF LIME in Ottawa county, Quebec, are now attracting more attention than the longer known deposits elsewhere. The principal operations have been carried on by the Buckingham Mining Company, which is now fully organised with a capital of \$400,000. The company has opened offices in Montreal and at Buckingham village. It has under construction a steamer for towing barges on the Lievre river, and a mill for the manufacture of piambago. During the year the company mined about 1400 tons of phosphate, and made a first shipment of

MAY 26, 1877.

MAY

100 tons to England; the average between 80 and 85 per cent. of pure phosphate. The company employed between 25 and 30 men at mining during 1876, and will have 100 at work the present season. The researches of Mr. Vennor, of the Geological Survey, show that a great trough of crystalline limestone exists between the Lievre and Gatineau rivers, towards the centre of which the apatite will not probably be found as abundantly as along each of its sides. The shipments of phosphates were—From Montreal, in 1874, 916 tons; in 1875, 1041 tons; in 1876, 2495 tons. From Quebec—In 1873, 195 tons; in 1874, 224 tons; in 1875, nil; in 1876, 73 tons. Apatite, yielding 80 per cent. pure phosphate, sells in England at present for \$28·38 per ton, and the total cost, up to the moment of delivery there, is about \$15·90, leaving a profit of about \$12·48 per ton. The manufacture of soluble superphosphate from Canadian apatite has been steadily continued by Mr. Alexander Cowan at the Brockville Chemical and Superphosphate Works, but the enterprise has not yet begun to receive the encouragement which it deserves from the farmers of the Dominion. One of the principal markets has hitherto been found in Nova Scotia. Now that breadstuffs are likely to command a high price it is to be hoped that this valuable manure for wheat lands will be better appreciated in the province of Ontario.

During the year a PYRITES mine has been opened at St. Jerome, in Quebec, chiefly through the enterprise of the Rev. Father Labelle. In addition to the sulphide of iron, the ore contains traces of cobalt, nickel, and silver. A workable deposit of iron pyrites, if found in the Lake Superior region, would be of more value than one in the eastern part of the Dominion, since it would be available for the manufacture of sulphuric acid in the Western States, where both coal and salt are cheap. These three substances are at the basis of various chemical manufactures, the products of which command high prices in the West. Mr. Cowan has continued to work his pyrites quarry near Brockville, and is producing large quantities of sulphuric, nitric, and hydrochloric acids.

Operations for SLATE have been prosecuted with vigour, under Mr. John Stewart, at the Rankin Hill Quarry, four miles east of Acton Vale, in Quebec. An average of 50 or 60 men have been employed during the year, principally in opening and developing the quarry, but a quantity of slate has also been prepared for market. The quarry contains both red and green slates, which are used principally for ornamental purposes. The colours, which are bright, do not appear to be liable to fade like those of the imported varieties, and the quality of the slates is otherwise good. They obtained a medal at the Centennial Exhibition. The production of the New Rockland Quarry, in the township of Melbourne, in 1876 was only about 4000 squares, against 7200 in 1875. The number of men employed varied between 12 and 61, and averaged about 40 for the year. The internal dimensions of the quarry are now 350 ft. in length by 130 ft. in width, and from 90 to 120 (in different parts) in depth. In an article on Canadian roofing slates written in 1863, Mr. Bell pointed out the prospect of obtaining a market in Europe for the excellent slates of the Melbourne band, and now the New Rockland Company have entered into contract to furnish in England at a good price all they can make during the present year. They propose to employ about 100 men, and expect to produce between 10,000 and 15,000 squares within a year.

Although occurring largely in Frontenac, Lanark, and Argenteuil, PLUMBAGO has only been mined in Ottawa county. The steam mill being erected by the Buckingham Mining Company is situated 6 miles west of the village of the same name. The 16-stamp mill of the old Canada Plumbago Company was burnt in 1875, during which year and 1874 it had been employed in working up the ore on hand, principally into stove-polish. The Dominion of Canada Plumbago Company have had a 20-stamp mill at work preparing various forms of plumbago for market. On the property belonging to this company the mineral occurs in the form of veins, on which several shafts have been sunk, and in the form of a bed of a less pure variety. The company were shipping a carload a-week in January, and the splendid display of crude and manufactured plumbago, crucibles, &c., made by this company at the Centennial Exhibition was universally admired. MICA, which is valuable for making stove windows, mica powders, &c., occurs almost invariably along with the phosphate of lime in North Burgess and elsewhere, a large mass of it having been discovered in Chesterfield Inlet, on the west side of Hudson's Bay, in the central part of the Dominion.

The refractory properties of ASBESTOS, which were well known to the ancients, render it available for a variety of modern purposes. As long as it was believed to be too scarce to be of much economic importance it was but little used outside of the chemist's laboratory, and a very small quantity supplied the market. Now, however, that it has been found so useful for steam packing, fire-proof roofing, &c., considerable demand has been created. It is found in greater or less abundance in various parts of Europe, the finest coming from Italy. The United States are principally supplied from Staten Island and Maryland, but it is found also in Virginia, New York, and other States. Its value ranges, according to quality, from \$10 to \$60, delivered. In Canada asbestos is either known or reported to occur in various localities. In some of these the mineral is true asbestos, while in others it is either chrysotile or picrolite, fibrous varieties of serpentine, which answer the same purpose. The constantly increasing use of BARYTES for the fraudulent adulteration of white lead is giving it a value which it did not formerly possess in this country. The manufactory of Messrs. Thos. Ramsay and Co., of Montreal, consumed all that was produced in Ontario and Quebec in 1876. The barites required in 1876 by the Dolphin Manufacturing Company, of Nova Scotia, for making paints had to be imported, although in former years they obtained a sufficient supply at Five Islands.

With regard to PETROLEUM, it appears that the total quantity of crude oil and distillate manufactured in the year ending June, 1876, was 4,838,215½ gallons, and Mr. Bell estimates the crude oil sent from Petrolia at 220,000 barrels. It is difficult to obtain correct figures with regard to the petroleum business of Ontario, but it is believed that there are still between 300 and 400 wells in the Enniskillen region capable of producing oil, about half of which were in operation during the last year. The industry gives employment to about 500 men in the production, and to about 300 in the refining of the oil. The greater part of the crude oil is refined at London, Ontario, where some 15 establishments are in operation. For some years back but little petroleum was exported from Canada; however, towards the close of 1876 a revival in the trade commenced, and considerable shipments of refined oil were made. By the improved processes of refining a perfectly colourless and thoroughly deodorised illuminating oil, standing a high fire-test, is now produced from our Canadian petroleum, at a price which enables it to compete in foreign markets with the best refined oils from the United States.

The most important fact of the year in connection with the SALT interest in Ontario has been the completion of Mr. H. Y. Attrill's boring at Goderich, which proves the great thickness of the rock salt under that region. It appears that six beds of solid rock salt were passed through, having an aggregate thickness of 126 ft. A considerable portion of this thickness Dr. Hunt found to be almost chemically pure, containing over 99½ per cent. salt. Mr. Attrill is about sinking a shaft to work these beds. The quantity of salt made in the whole of the Ontario region in 1876 was probably quite equal to that of the previous year, which amounted to between two and three millions of bushels. The returns with regard to gypsum were not to hand. In Nova Scotia and New Brunswick the average annual quantity was quarried and shipped. The demand for land plaster in Ontario is supplied from Northern New York, and from the comparatively thin beds of gypsum occurring along the lower part of the Grand River. The hydraulic cement consumed in the Dominion is supplied principally from Thorold and Limehouse. Should any considerable quantity of this material be required for the construction of the Pacific Railway it might be manufactured from certain beds of the Neponit series of rocks at Thunder Bay, but the only way of determining the value of supposed cement stones is by actual experiment, as their chemical composition varies greatly, and every different kind requires some peculiarity in treatment suited only to itself. The granites of Canada may properly be noticed in connection with her other mineral resources. Mr. Robert Forsyth,

of Montreal, continues to manufacture monuments, pillars, &c., from the beautiful granite of his island near Gananoque. A hill of similar granite on the east side of the harbour of Kingston has been leased by the Hon. John Young, of Montreal. The Bay of Fundy Red Granite Company are doing a large business in manufacturing granite at St. George, New Brunswick.

FOREIGN MINING AND METALLURGY.

The past week has been a dull one in the French coal trade, and any opinions which may have been formed as to the probable effects of the war upon the trade have thus far not been found to amount to very much. The aspect of French home politics, as our readers are aware, has been rather troubled recently, and this has not improved the tone of the French coal trade. The summer opens in a discouraging fashion; as to this there can be no doubt. Some apprehensions are entertained as to the success of the crop of sugar-beet, and by consequence as to the beetroot sugar manufacturing season; this is, of course, another adverse circumstance in connection with the French coal trade. No interesting news reaches us from the Nord or the Pas-de-Calais; no material change is anticipated in the markets until the approach of winter. In the basin of the Loire there has been a slight—but only a slight—return of activity; prices have exhibited little change. A body formed under the title of the Association for the Improvement of Means of Transport has just issued an interesting and very complete map of the interior navigation system of France.

An improvement recently noted in the Belgian coal trade has not, perhaps, become more decided, but at any rate it is maintained. English coal has been rather advancing in price, and hence there has been a greater tendency to resort to Belgian coal. It cannot be said at present whether or no the firm tone observable will become more decided; but, upon the whole, buyers have shown more disposition to do business. The outbreak of war in the East of Europe has had something to do with the rise in English coal. The Council of Administration of the Crachet and Picquery Colliery Company reports that the production of coal effected by the company in 1876 was 143,937 tons, or 8681 tons more than the corresponding production for 1875. A dividend at the rate of 5 per cent. per annum, absorbing 6000/., is to be paid for 1876. A sinking fund has been commenced with a view to the redemption of the share capital in 75 years; at the close of 1876 this fund amounted to 4613/2. The net profit realised by the Herve Wergifose Colliery Company for 1876 amounted to 4032/., but it has been resolved to carry this sum to the "fund of foresight," and not to pay any dividend for the past year.

An association has just been formed in Germany, the object of which is explained by its title, "the Westphalian Coal Export Association." The Memorandum of Association is to remain in force provisionally for one year until April 30, 1878. Contributors representing an annual output of 3,750,000 tons have already been enrolled, and an additional number of members is expected sufficient to bring up the total annual output represented to 6,000,000 tons. In an article on the subject, the Westphalian journal Gluckauf observes that "in the course of the last few years Germany's ability to supply coal to the markets of the world has vastly increased. No fewer than thirty large new pits have been sunk or are in process of sinking, while many of the old workings have been enabled by the discovery of new seams and the completion of their appliances to increase their output very considerably. Notwithstanding the depression in the iron trade, the Westphalian output was greater last year than at any previous time; while even in November, in spite of the continued stagnation of trade and the extraordinary mildness of the weather, a greater quantity of coal and coke was carried by rail than ever before. These facts, combined with the certainty that Germany in a very short time could increase her output 50 per cent., are naturally calculated to bring prominently forward the idea of establishing a German coasting and export trade in coal." Special arrangements with several of the railway companies for the transit of coal to the North Sea ports have now for some time past been in operation, and in the ports both of the North Sea and the Baltic manifold relations have been opened with Chambers of Commerce, mercantile firms, and wharf owners, with a view to promoting the consumption and export of German coal in the joint interests of those concerned. As we have from time to time reported, several cargoes have been already despatched to St. Petersburg, Riga, Spain, and other places, and additional contracts have been secured.

As regards Belgian metallurgical industry, we may note that the Angleux Steelworks have contracted to deliver to the house of Gouin, at Paris, the rails required for the Bona and Guelma Railway (Algeria). This is almost the only piece of intelligence which has to be communicated for the week, although some small orders have come to hand for merchants' iron, plates, nails, rivets, &c. Quotations are not very definitely established, and it is easy for buyers to enforce comparatively advantageous terms. Experiments are now being made at Brussels with a view to the introduction of steam traction upon tramways. A steam car, which is thus being tried, has been patented in the name of the General Tramways Company and MM. Béde and Co. The car was built in the workshops of the firm named at Verviers. Belgian industrials are beginning to direct some little attention to China as a possible future outlet for their products.

The aspect of the German copper markets has been rather unfavourable, transactions have been limited, while prices have been uncertain. Business in copper has been comparatively limited at Paris, but prices have somewhat improved. Tin has been firm at Rotterdam, but there has not been much business passing; disposable Banco has been firmly maintained at 44 fl., but at this price very few transactors have been reported. Business has been passing at Rotterdam in Billiton at 42½ fl., for delivery in July; the price has been 42 fl. The Paris tin market has been well supported, the German tin markets have been colourless, and prices have generally exhibited a downward tendency. Lead has been tending upwards at Paris; the German lead markets have also been firm. Zinc has been maintained with some difficulty at Paris; at Marseilles rolled Vieille-Montagne zinc has made 28/ per ton. Upon the German zinc markets the article has been greatly neglected.

Small orders by no means make default in the French iron trade, and prices have been sustained pretty well. Machine iron has been firm in the Haute-Marne, but the demand for pig has been generally weak. The treaties of commerce question is considered to have made some little progress in the French Legislature. The Chamber of Deputies has appointed a commission of 33 members, charged with the task of studying a bill relating to the establishment of a general customs tariff. The composition of this commission is not very bad; the majority of its members are favourable to the free trade policy inaugurated in 1860, and a reasonable reduction of duties is hoped for. A boiler in a French ironclad recently exploded; the incident occasioned, of course, a certain sensation. A contract for T-iron has recently been let in connection with the construction of the buildings for the French Universal Exhibition of 1878; the contract price was 13/ per ton. The Firminy Ironworks Company has concluded a contract for the delivery of steel axles, with wheels with full centres, to the Western of France Railway Company, at 18/ 14s. 6d. per ton. The Alais Mines, Foundries, and Forges Company has announced a dividend of 17. 4s. per share for 1876.

APPLYING MOTIVE-POWER.—The invention of Mr. S. DANIEFFFSKI, of Wilna, Russia, consists in the employment of a box or barrel in which is placed a coiled spring from which the power is obtained; on one end of the barrel is a wheel with 200 teeth, which gears into a driving pinion having 21 teeth, and making 27 revolutions per minute. Upon the shaft of the said pinion is a wheel with 200 teeth gearing with a second pinion with 21 teeth, the shaft of which carries a third wheel with 200 teeth, driving a pinion with 21 teeth; on the shaft of this pinion is placed the fourth wheel with 200 teeth, which drives a pinion with 21 teeth placed on the shaft of the machine (such as a sewing machine) to be driven. A suitable brake is provided for stopping the machine, and also a proper spring and click work. The winding up of the spring is

effected by means of a winch handle and a wheel with 60 teeth, gearing with a pinion of 21 teeth upon the barrel arbor.

THE NEW QUEBRADA COMPANY'S MINES.

An exhaustive report upon the property of the New Quebrada Company, by Mr. John Darlington, M.E., who has just returned from Venezuela, has been issued to the shareholders, and although no means encouraging as to the value of the property will enable those interested to determine what course it is best for them to pursue with a view to develop the mines in such a manner as shall secure them some return for their outlay. The mines known as Comaragua, Titiria, San Antonio, and Aroa, are on a belt about 5 or 6 miles long, and 57 miles from Tucacas, a port on the Gulf of Venezuela, 32 miles from Puerto Cabello, is reached by a small sailing sloop in six hours, the town being in a saline, quite flat, and only 2 or 3 ft. above the level of the sea. There are railway buildings, the inhabitants' houses, one or two small hotels, and two or three stores for the sale of provisions and goods. Fresh water is brought from the River Tuque, three miles distant, to tanks at the railway terminus. The ore floor is close to the shipping quay, the ore being shipped from the wharf, but must anchor half-a-mile off. The extension of the line to the port, the town being in a saline, quite flat, and only 2 or 3 ft. above the level of the sea. There are railway buildings, the inhabitants' houses, one or two small hotels, and two or three stores for the sale of provisions and goods. Fresh water is brought from the River Tuque, three miles distant, to tanks at the railway terminus. The ore floor is close to the shipping quay, the ore being shipped from the wharf, but must anchor half-a-mile off. The extension of the line to the port, the town being in a saline, quite flat, and only 2 or 3 ft. above the level of the sea. There are railway buildings, the inhabitants' houses, one or two small hotels, and two or three stores for the sale of provisions and goods. Fresh water is brought from the River Tuque, three miles distant, to tanks at the railway terminus. 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MAY 26, 1877.

SUPPLEMENT TO THE MINING JOURNAL.

575

and salaries, show that it is necessary to send from the mines to Swansea or affording not less than from 12 to 13 per cent. of copper, dry assay; that the information available tends strongly to the conclusion that the Bolivar Railway and Quebrada Company should be united, so as to allow both undertakings to be worked for the common good under one management; and that various circumstances point to the necessity of applying the expenditure mainly to exploratory and productive works, with the view of rendering the mines of permanent and profitable duration.

In conclusion, Mr. Durlington remarks that he has been anxious throughout the course of a lengthy investigation to arrive at the truth. Before reaching the property he had fully acquainted himself with various reports relating to it, and felt it his duty to test with impartial care any definite statements which they contained. Hypothetical and extravagant calculations showing the value of the lode between Arequipa and Titicaca have been disregarded. What can be fairly said is that it is likely to contain large and valuable deposits of ore. Reverting to the Arequipa lode, it must be remembered, that it has only been effectively wrought for the trifling length of 50 ft., that it has only afforded a large quantity of ore, but whatever may be the average percentage of the yellow ore, the task will be to employ the best means to render it profitable. Moreover, the lode should be systematically and boldly developed for the purpose of adding value to the property, and remunerating to a satisfactory extent the large amount of capital involved in the enterprise.

[We are informed that the directors intend calling the shareholders

together at an early date, to consider this report.]

A PROFITABLE MINING INVESTMENT.—The Calumet Hecla Copper Company, located in Michigan, with an original capital stock of \$200,000, in 80,000 shares, at their par value of \$25 per share, and of which \$1,200,000 were paid up in the course of the development of the property, has paid out to date no less than \$11,450,000 in dividends to its shareholders. The last dividend was paid in February, 1877, of \$5 per share. As may be supposed, the shares of the company command a high price—or are quoted at \$182 at latest sales. Their stamp-mill is eight miles distant from the mine by a good railway. It has been a veritable bonanza for its shareholders for years.—*Mining Record* (New York).

CRAISMORE MAMMOTH is another highly reputed Utah mine, the property of Samuel McIntyre and Co. The greatest depth by shafts, 500 ft. two main working tunnels, with other levels and drifts, making a total of 1250 linear feet. Ore has been traced on the course of the vein, in the different levels, from 100 to 400 ft., and found in chambers from 6 to 30 ft. in width; 50 ft. below the level of the new tunnel, and upward of 300 ft. from the surface, a cross-cut was made all through quartz, striking the wall at the distance of 61 ft. from the shaft: 35 ft. lower another cross-cut has been extended through 51 ft. to the west without reaching the wall. In addition to large reserves of 26 per cent. copper ore, there are immense bodies of auriferous and argentiferous ores, some of which is exceedingly high grade. The great mass of the silver ore works from \$40 to \$100, and a considerable amount of first-class, selected, runs from \$1000 to \$1500. A very rich vein of gold quartz was not long since struck, and cut on the different levels, from 10 to 14 ft. in width. The ore has an average working value of \$250 per ton: selected lots have sampled from \$25,000 to \$100,000, single assays reaching \$100,000. The yield last year was 2500 tons, with gross value of \$125,000.—The greatest depth attained on some of the principal mines at Stockton are as follows: West Extension, Silver King, 480 ft.; Muscatine, incline, 420 ft.; Iroquois incline, 190 ft. from face of incline; Legal Tender, 120 ft.; Great Basin, 265 ft. and the others from 60 to 150 ft. The deeper the mines are sunk the richer are. Climate such that the mines can be worked the whole year round.—*Ibid.*

Meetings of Public Companies.

WEST GOGINAN SILVER-LEAD MINING COMPANY. An extraordinary general meeting of shareholders was held at the offices, East India Avenue, on Thursday (Mr. Wm. BROOKES in the chair), for the purpose of passing the following special resolution:

The special resolution passed at the extraordinary meeting of the shareholders held on Nov. 22, and confirmed on Dec. 7, 1876, was amended by adding thereto the words following, that is to say:—"That after the said new shares shall have ceased to be entitled to the preferential dividend of 10 per cent. the profits in any and every year shall be divided by appropriating one fourth thereof amongst the holders of the 2000 preference shares, including those who have already received allotments thereof, and the remaining three-fourths amongst the holders of the ordinary shares."

The notice convening the meeting having been read by the secretary,

The CHAIRMAN said he would endeavour, in a few words as he possibly could, to explain the object which he had in sending the circular, which he hoped they had all received. In its passage from his hands to those of the printer, the circular had passed through the hands of several leading members of the company, who had made some modifications therein, but the leading principle had been retained—that something more than usual should be given in the shape of advantage to the shareholders who come in at the present crisis. His letter, if it had gone out in its original form, would have contained a good deal more detail as to what the preference shareholders would gain and the ordinary shareholders would lose by this fresh arrangement, but it was generally thought that such detail would make it too complicated, and muddle up the scheme so much that it would be hardly intelligible. He would now, however, endeavour to put the matter in the clearest possible way. They must understand that this was a relative matter. For instance, if half-a-dozen of the shareholders were to give him a penny each he should be the fortunate possessor of sixpence, but the givers would only lose a penny each, so there was a great difference in the gain and the loss. He would use a plain illustration to show exactly how the matter stood. There were 12,000 ordinary and 2000 preference shares, a proportion of six to one. By giving a quarter of the net profit to preference and three quarters to the ordinary, we are making the preference twice as valuable as the ordinary. If I have four oranges to give to seven children, and I give a quarter, that is one whole orange, to one of them, it follows that the other six will only have half of one each. Then as to what the ordinary will lose. Suppose I have seven children, six boys and one girl, the girl would be the preference share. I have a basket of oranges, enough to give them eight each, but I want her to have the most, and so I make the boys give her one each, she will then have 14, and they will each have seven. By making the ordinary give up one-eighth the preference shares receive double the amount the ordinary receives. A letter had been received from a gentleman to the effect that there would, if the resolution were carried out, be a very heavy loss to the ordinary shareholders, but this really showed that the gentleman did not understand the matter, because by giving up one eighth of a share it really took only one-eighth of a share from him. Another gentleman wrote to say that he heartily supported the proposition, and would send his 50/- Mr. Attwood, the largest shareholder, fully approved of the scheme. Another reason why the fullest publicity should be given to the scheme was that the shareholders might not say they were deceived in case of the mine passing out of their hands, and afterwards turning out a splendid affair. They would, probably, have seen by the *Mining Journal* that a great dispute was going on between a certain captain and some former people who owned a mine, who complained that whereas when they possessed it the mine made no returns, yet now that it was in the hands of the captain himself it was making very good returns indeed. Now, he had no wish that such a thing should occur in connection with this property, and, therefore, he wished the shareholders to know exactly how they stood. In a recent number of a public journal the following remarks were made with regard to this mine:

"Much improvement is again reported at this mine: the lode is not only maintained its character, but is improving as greater depth is attained. Patience must be manifested by the shareholders for a few months longer, and we have no fear but that they will be amply rewarded. The new capital is being gradually absorbed by a section of the shareholders. We are surprised that it was not all taken directly it was offered, and we cannot conceive a single member of the company being so unmindful of his best interests as to neglect to secure his proportion of the additional capital. It is not too late now to repair the omission. Let every member of the company at once inform the secretary that he will take his proportion, and the future of the mine is assured. If this opportunity is permitted to slip, it will be a lasting source of regret to all concerned, for so sure as night follows upon day, and the spring succeeds the winter, is there a little band of capitalists anxiously waiting for the moment when they can profit by the parsimonious folly of some of the proprietors in this company. We say emphatically to the old members of the company—Be up and doing, take the few shares that remain, and do not let the vultures have it all their own way."

He had really no further remarks to make. There was but little opposition made to the scheme. It was giving more than had hitherto been proposed to persons who were willing to put money in the concern. On the preference shares it gave them 10 per cent. as long as the mine was struggling up, and when the mine reached the good position they had every reason to hope and believe it would, they

would get a permanent benefit in having the interest doubled. In conclusion, the Chairman moved the resolution given above.

A SHAREHOLDER said he had great pleasure in seconding the resolution. He was sure that if the mine passed into other hands and afterwards became prosperous no one would for a moment accuse the Chairman and directors of not having done all they possibly could to make the mine a success. There was little doubt that if the shareholders came forward and carried out this scheme in due course the mine would not only be in smooth water but, in a paying condition. He himself had always had great faith in West Goginan, although hitherto it had been disappointing. At the present time they had gone no depth in the mine, comparatively speaking, but there was every prospect that in going down they would find a good mine. He thought the fact that Mr. Attwood had held his share from the commencement, and still held them, was a very encouraging feature to the shareholders.

Mr. KIRKLEY said that Mr. Attwood knew most of the best mines in the neighbourhood, and had hitherto been very successful in all his prophecies, and he fully agreed that it was very encouraging to know that the gentleman entertained a good opinion of the property, because he was a gentleman whose opinion was entitled to considerable weight.

A SHAREHOLDER said he saw there were only 638 shares now to be disposed of, and if these were not all applied for the 468 which had been disposed of conditionally would have to be recalled. He thought it would be a very great pity if those other shares were not disposed of, and he sincerely hoped that the shareholders would come forward and take up those shares. He hoped that after the passing of the resolution the shares would be at once applied for.

In answer to a question, the CHAIRMAN said that if the shareholders did not take them all up the remainder would be offered to the public.

In answer to a question, Mr. BOWMAN said he should be very sorry to see the mine given up at the present time, because he had a good opinion as to its future prospects.—The CHAIRMAN said that, of course, the present resolution would be retrospective in its action, and those who had already subscribed would receive the full benefit of it.

The resolution was then put and carried, and the meeting broke up.

PENNERLEY MINING COMPANY.

A special general meeting of shareholders was held at the offices of the company, Austin Friars, on Wednesday,

Mr. PETER WATSON in the chair.

The notice of meeting having been read, Mr. W. J. LAVINGTON (the secretary) read the following report:—

May 22.—There is very little alteration in the prospects of the mine since our report for the meeting on the 2nd inst., in consequence of the accident then reported. The engine started work yesterday afternoon, and continues to work admirably, and is forcing the water satisfactorily. If all goes well we calculate seeing the 80 by Monday morning next. The stoppage in the bottom of the 70 is worth 30/- per fathom. A new stoppage in the back of this level has greatly improved, and is worth 30/- per fathom. There is a fine piece of unwrought ground in this direction, which at present promises well for the production of many tons of ore. In this section of the mine there are 11 tribute pitches at work by 31 men, all of whom are earning good wages in their respective pitches: prices from 9/- to 10/- per ton.

Potter's Pit: The lode in the rise in the back of the 45, on Wilson's lode, is yielding some good stones of ore. In the 25 driving east the lode is 1 ft. wide, of good character, promising improvement. We have four pitches at work by eight men. Immediately the water is in fork at the 120 the driving of the cross-cut to intersect the Warm Water lode will be resumed, and in a week or nine days we expect to see the lode, where there is every encouragement to look for a course of ore. This will at once open up a new feature, and put us in a position for increased returns. The 120 and 130 east are also very encouraging points, only they require further development to render them abundantly remunerative. In conclusion, we beg to state with additional capital carefully expended this mine will yet prove a profitable one, and on our part all energy and economy shall be exercised in the furtherance of all points for the speedy and effectual success of this most desirable object.—W. T. HARRIS, J. DELBRIDGE.

The CHAIRMAN said that this meeting had been called for the purpose of confirming the resolutions passed at the special meeting held on the 2nd inst. The shareholders would remember that those resolutions were for the purpose of authorising the issue of 6000 preference shares at 1/- each. The money was needed to meet the existing liabilities and to carry on the operations at the mine. He sincerely hoped that every member of the company would assist in taking these shares. Personally he believed in the mine, and felt sure that with further development the company would yet turn out a success. Before moving the resolution he would again impress upon the whole body of shareholders the necessity of interesting themselves in the success of this issue of new capital, for if not taken up, and that promptly, the company must come to an end. He would move that the following resolutions, passed at the special meeting held on the 2nd inst., be confirmed:—

"That the nominal capital of the company be increased by the sum of 12,000/-, divided into 6000 shares of 2/- each;" "that the said shares be preference shares, and entitled to a preference dividend of 15 per cent. per annum on the full nominal amount thereof, in priority to any dividends on the ordinary shares;" "that the new shares be treated as fully paid up on payment of 1/- per share thereon, the shareholder not being liable to pay the other 1/-;" "that the new shares be in the first instance offered to the present shareholders of the company, in proportion to their holdings, and that if the offer be refused by any shareholder the shares so refused be issued in the discretion of the directors;" "that 5s. per share be paid on application for the new shares, and 5s. on allotment, and the remaining 10s. be called up by the directors in their discretion, but no call to be made within three calendar months from the last call or from the allotment, as the case may be;" "that the preference shareholders have the right at any time within four years from this date to convert their shares into ordinary shares of the same amount;" and "that the Memorandum of Association of the company be modified so far as necessary to give effect to the foregoing resolutions."

Mr. GEACH, in seconding the confirmation of the resolutions, said he was glad to say that an improvement had been reported at the stopes at the 70, on Warm Water lode, and that the engine was working well. He would remind the meeting that the special object to which the new capital would be applied was the driving east towards Potter's Pit, on the Big Ore lode, and he advised that boring-machines be used. In reply to Mr. BENTLY, he said the level could be driven 5 or 6 fathoms a month; that at every 50 fathoms cross-cuts south 10 fathoms in length should be put out, which would intersect Warm Water lode, and similar cross-cuts to the Potter's Pit lode; both lodes would again be driven on when found productive. This method of exploring the deep section of the mine would be very simple, and there was no doubt in his mind that the run of ore which had accompanied the sinking at Potter's Pit to the 100 would be continuous. The appearances were exactly similar to the parallel lode worked in the Tankerville Mine, within a few fathoms of our boundary, and 100 fathoms deeper. Without estimating the value of our boundary, and 100 fathoms deeper. Without estimating the value of the ore discovered by driving forward the 130, he calculated that Potter's Pit would produce, in and above the 130, 1000 tons of ore. In addition to this known deposit is Wilson's lode, situated between Big Ore and north lode, productive of good tributaries' ground. At Warm Water lode, 80 ft. level, the ore also appears to be lengthening, and it is anticipated that the cross-cut at the 120 will open a valuable section of ore ground.

The resolutions were then put to the meeting and agreed to, and the usual vote of thanks to the Chairman terminated the proceedings.

SCOTTISH AUSTRALIAN MINING COMPANY.

The report to be submitted by the directors to the half-year general meeting of shareholders, at the City Terminus Hotel, on Tuesday, gives the following particulars respecting the property of the Association:—

LAMBTON COLLIERY

The company's sales of coal amounted to 75,145 tons for the half-year ending December 31, and the net profit realised from the colliery during that period to 12,856/- 10s., the necessary disbursements for maintenance and renewal having been made. The depression that has so long prevailed in all trade has continued to influence unfavourably the coal trade of the colony. Notwithstanding that two small additional collieries have been at work during the period now reported on, the total general production of all the northern collieries shows a falling off of 101,028 tons, as compared with the corresponding six months of 1876. The directors are able to state that the Lambton Colliery has obtained a full proportionate share of the trade. The railway and rolling stock, together with the colliery and its appliances, are reported by Mr. Croudace, the colliery viewer, to be in good order and condition.

THE CADIA PROPERTIES IN NEW SOUTH WALES. The buildings, machinery, and mining appliances on these properties have all been repaired and put in working order. The shafts and levels have been cleared, and the timbering where necessary repaired. A certain extent of new workings has been executed, and by the latest advices 400 tons of copper ore estimated to average nearly 10 per cent. for copper, have been raised. At the present depth, which is still a shallow one, being only 32 fms., the lodes have not been found to produce ore so large or of so high a percentage as they did at and near the surface, whence a very large quantity of rich ore was raised, and it seems, therefore, that a more productive condition of the lode is to be looked for at a greater depth. In most metalliferous formations lodes which are found to be very rich and near the surface, although they may become less so at a short depth down, are usually found at a further depth to resume a productive character, and to yield ore more regularly and permanently. This is a feature which is especially observable in the mineral deposits of the Australian colonies, and there seems no reason to think that these properties will form an exception to this general rule.

Two auriferous quartz reefs on the properties have been partially opened up to the depth of 120 ft., and 200 tons of the stone raised from one of them were, at the date of the latest advices, ready to be crushed as soon as there should be sufficient water in the creek (which had been much reduced by a severe drought) to set the turbine and stamps to work. A sufficient supply of the most approved ore dressing machinery has been sent out from this country, and one of the furnaces formerly in use having been repaired, smelting was commenced early in March last.

The completion of the railway from Sydney to Orange, which is situated within ten miles of the mines, has been announced, and was expected to be opened for traffic on the 1st of this month. The properties comprise 3272 A. 0. R. 23 P. of freehold land; plans (Nos. 4, 5, 6, 7, and 8) of the same and the workings thereon accompany the report of the directors.

COPPER PROPERTY IN QUEENSLAND.

During the half-year now under review the operations at this property have been continued: two smelting furnaces have been completed, and some necessary buildings erected. Up to Feb. 7 68 tons of copper had been made from the ore raised from the mine, the whole of which was then in course of shipment to England; and there was at the date of the latest advices sufficient ore and regulus on hand to make about 32 tons more. From the plans of this property (which consists of 1614 A. 2 R. 0 P. of freehold land) it will be seen that but a very shallow depth, 28 fms., has as yet been attained. The some features that have been alluded to as manifesting themselves in the Cadia properties are observable in this property also. The question of the best course to be pursued in dealing with this property has been receiving the anxious attention of the board and manager. The latter having recently paid a short visit to this country, during which the board had the advantage of personal communication with him on this and other subjects of importance in the company's affairs, has just taken his departure for the colony, where he will carry into effect such measures as may seem best calculated to promote the interests of the company in regard to this property.

ACCOUNTS—DIVIDEND.

The balance of profit shown by the general revenue account (including the sum of 5308/- 19s. 1d. brought forward from the previous account) is 16,634/- 2s. 1d. The directors propose the payment of a dividend at the rate of 15 per cent. per annum on the paid-up capital of the company, 140,000/-, free of income tax, which will require

And to carry forward to next account

It is proposed to make the dividend payable on Tuesday, June 5.

DEVON GREAT CONSOLS COMPANY.

At the half-yearly meeting of shareholders, to be held at the office of the company, on Tuesday, the following report of the directors will be read:—

The quantity of ore sampled is in excess of that of the previous half-year, but not quite so much as was anticipated at the last meeting, operations having been hindered by weather and other causes beyond the agent's control. The mines report shows that the principal agent is still sanguine that an increased quantity may be shortly obtained for sampling. The continued fall in the price of copper has considerably militated against the company. The sale of arsenic have quite realised anticipations, the payments for which have been most regular, and highly satisfactory. The exploratory work required by the lessor has progressed continuously to the satisfaction of his agent, but as yet without any profitable result. The relate on the royalty has been duly paid accordingly. None of the other items require observation, being such as usually appear at each meeting of the members.

The cash balance of 9125s. 2s. 7d. is sufficient proof of the success of the company, and if the sales of ore realise the anticipated amount next month the directors will have the pleasure of declaring a dividend in June or July.

Capt. J. Richards reports that "the ore reserves throughout the different mines amount to 33,340 tons, an increase during the past year of 1983 tons, and the new machinery for dressing the accumulations of tailings is now complete and in full working order, we hope soon to increase the returns to 1000 tons per month."

For remainder of Meetings see to-day's Journal.

PROSPECTS IN THE BREAGE DISTRICT.

In the midst of the murky darkness which has for so long a period settled down upon the tin mining industry of the county, it is cheering to hear of any district upon which the sun may be said to penetrate the almost universal gloom. We have grounds for stating that there are more than one such bright spot in this formerly renowned district.

At WEST GODOLPHIN, we learn that the adventurers have discovered very valuable lodes, which they consider they can work to much profit even at the present depressed prices for tin, and they have been so far encouraged by their bright prospects as to erect a powerful engine and stamping machinery at a very large expenditure, and a tall chimney stack is gradually rising from the ground at the present moment. We wish them all manner of success.

Proceeding further to the immediate neighbourhood of Great Wheal Vor, formerly the giant of the district, but now, alas! numbered with the things of the past, we find, nestled in a green valley, another very promising undertaking, called POLROSE. Here a small work has been in progress for some time, and from small beginnings is gradually assuming large proportions. The one engine of moderate capacity, which has hitherto sufficed for both pumping and stamping, is now found inadequate for the increasing duty laid upon it, and the wanderer in Breage may now observe a second chimney shaft rearing itself up towards the sky. The adventurers here have been reduced, we learn, by numerous secessions to a very small company, but those that remain appear to be staunch miners, determined to give Polrose a fair trial, and it would seem that their enterprise is likely to be crowned with the success it so well merits. At 50 fms. below adit they have a junction of two masterly lodes with opposite underlays, forming at the junction a mass of lode exceeding 6 fms. in width, and of fair produce. This large deposit will pay well even at the present starvation prices of black tin, and the adventurers are very wisely determined to attack this enormous bulk by a battery of 80 heads of stamps, capable of reducing over 2000 tons monthly. They have already raised over 14,000/- worth of black tin, and fairly calculate upon concentrated mineral wealth in sinking below this magnificent deposit. We think they deserve every success, and hope they may attain to a large measure of it. These adventurers are further encouraged by the very liberal treatment they have received from the lord of the soil, who, in a manner which deserves to be held up for imitation to all the lords in the county, declines to damp the enterprise of his persevering tenants by taking money out of their pockets in the name of royalty. He has announced his intention of remitting all dues until the returns have begun to balance, and more than balance, the cost sheets, and something remains in the "dish" for the hard-working miner. This lord of the soil is Lord Churston—*si sic omnes*.

THE O'HARA CHAMPION FURNACE.

SAFETY APPARATUS FOR MINE CAGES.

In connection with the detaching apparatus of mine cages, Messrs. LOMSEY and HANN, of Brotton, Yorkshire, propose the use of two jaw hooks of the usual description—two pieces of metal pivoted together in the middle, so that when the upper ends are closed together the lower ends are apart, and *vise versa*. These jaw hooks are provided with enlarged heads, in the faces of which a notch or indentation is cut, so that when the two faces are brought together the notches form a round hole for the reception of the pin to which the shackle fastened to the winding rods is attached, the outer sides of the heads being provided with projections, the use of which will be presently seen. Around these two jaw hooks a small wedge-shaped clamp of metal, having its lower end larger than its upper end, is placed, and kept in position by means of two copper pins, and when so in position it holds the upper portions of the jaw hooks with the shackle pin between them tightly together. Between the two jaw hooks a small wedged shaped piece of metal is placed with its larger end downwards. Upon the pin of the shackle to which the winding rope is attached, and which is held tightly between the two jaw hooks, as hereinbefore mentioned, two small metal plates are placed, and which are passed down the before-mentioned clamp on each side of the wedge, and fastened thereto by means of small copper pins.

The action of the apparatus will be very readily understood. Should the cage be wound beyond the proper distance the apparatus would cut a ring of metal placed in a beam above the shaft, and through which metal ring the winding rope works until the head of the jaw hooks projects above the ring, when the lower or enlarged end of the clamp comes in contact with a rim or enlargement formed upon the inside of the ring, and pressing thereon cuts the two copper pins holding the clamp in position and releases the two upper jaws, which at once liberates the rope end with its shackle and pin, and in its action leaving the jaws up the two small plates before mentioned with the wedge, the jaws being so constructed as only to allow the wedge to come as far up as to jam or fasten the pressure catches properly open upon the ring; the two small plates cut the copper pin by which they are attached to the wedge, and the rope end is then free. The machine is then properly keyed to the top of the ring, the danger of the jaws being only partially secured, or becoming accidentally released by shaking, or by the rotation or fall of the cage, being thereby entirely obviated.

Another arrangement for carrying the invention into effect consists of a pair of jaws of similar shape, but instead of being pivoted together in the middle portions thereof, they are separately hung from pins or bolts at their lower ends to a metal box which contains a pair of soft metal pins. A wedge is placed between the two jaws and connected to the winding rope by means of two metal plates carried by the shackle pin, and which pass down on each side of the wedge, and are connected thereto by a soft metal pin. The sole of action of this arrangement is that when the load is so far lowered as to allow the apparatus to enter into, and partly pass through, the ring hereinbefore mentioned as being placed above the shaft, the lower parts of the feathers which project come into contact with the lower part of the ring, and are depressed so as to cut the soft metal pins sustaining them. The jaws are thereupon released and opening allow the winding rope to escape, and in its action leaving the jaws it carries up the wedge and firmly fixes it between the jaws, and thus securely wedging or locking the latter on the ring. The soft metal pin is then cut, and the rope end is free.

By this last-mentioned arrangement the jaws are locked instantaneously to the ring, and the possibility of their being shaken off and the consequent dangers avoided, and owing to the feathers being separate it is impossible for the jaws to be released by striking the pit sides or buntions, or by anything falling on to it, for should one feather be struck and one jaw released the winding rope is still firmly held, and accidents from such causes are thereby prevented. Another advantage consists in the fact that the action of disengaging does not commence until the jaws are in a proper position to catch the ring, and therefore all danger of what has been termed a partial overwind, and the consequent inopportune closing, is avoided. They prefer that the ring into which the apparatus enters in the case of an overwind should, instead of being fitted into a beam, be bedded on elastic and bolted by means of its bases to two beams of timber, thus obviating the necessity for cutting away the timber as at present.

DEEP MINING SHAFTS IN EUROPE.

Twenty years ago the deepest mining shafts in the world reached only about 2000 ft. below the surface. The very deepest, we believe, is a metalliferous mine in Hanover, which has been carried down to the depth of 2290 ft. The deepest perpendicular shaft to-day is the Adalbert shaft in a silver-lead mine in Prizibram, in Bohemia, which has reached a depth of 3280 ft. The attainment of that depth was made the occasion of a three days' festival, and still further assisted by the striking off of a large number of commemorative silver medals of the value of a florin each. There is no record of the beginning of work on this mine, although its written history goes back to 1527. Quite recently an elegant commemorative volume has been written and printed, which is most interesting to those who have a taste for either the actualities or antiquities of mining industry. There are two other localities, however, where a greater depth has been reached than that of the Adalbert shaft, but not in a perpendicular line. These are—1. The Adalskalt bore-hole, near Rosenberg, not far from Berlin, which a few years ago had been driven to a depth of 4175 ft.—2. The coal mine of Viviers Remus, in Belgium, where the miners, by shaft sinking together with boring, have reached a total depth of 3542 ft. Turning from these two mines to shaft in unbroken perpendicular line has as yet exceeded the depth of 3280 ft. Taking each singly, the deepest shafts in the world at the present moment group themselves according to the following order:—

1.—The already-mentioned Adalbert shaft, 3280 ft. deep. As the top of this shaft is 1732 ft. above the sea level the bottom is, of course, 1548 ft. below it.

2.—Two shafts near Gilly, in Belgium, are sunk to the depth of 3547 ft. At this depth they were both connected by a horizontal shaft, from there an exploring shaft is sunk to a further depth of 4175 ft., and from there again a trial hole, 49 ft. in depth, is put down, so that the total depth reached is 3542 ft. As they did not in the last hole discover the sought-for coal seam, they have returned to the shaft at the 2847-ft. level.

3.—The Eingekerts shaft of the Lugauer Coal Mining Company, Beaufort, Lugau, in the kingdom of Saxony, is 2653 ft. deep.

4.—The Sampson shaft of the Oberhartz Lead and Silver Mining Works, near St. Andreasberg, Hanover, has a depth of 2437 ft., is at present the deepest shaft of Prussian mining.

5.—The winding shaft of the Rosebridge Colliery, near Wigan, Lancashire, England, has a depth of 2458 ft. Coal is drawn from the hanging on¹ at the 2418-ft. level; the time of the cage running this distance being 55 seconds; the winding rope has, therefore, an average speed of 44 ft. per second.

6.—A shaft at the coal mines of St. Luke, near St. Chaumont, in the Loire department, France, reaches 2233 ft.

7.—The shaft of the Dunkirk Colliery, near Dunkinfield, Lancashire, is 2009 ft. deep, but the mining is prosecuted to a further depth of 755 ft. by shafts from the lower levels, making a total depth of the mine of 2824 ft.

8.—The deepest shaft of the collieries near Ronchamp, in France, is 1881 ft. A similar depth has been reached by the argenteriferous mine near Kongsberg, in Norway. The mines belonging to the Roros Copper Works, in Norway, have worked to the depth of from 2540 ft. to 4270 ft.

9.—The Amalia shaft in the mine works near Schemnitz, in Hungary, 1782 ft.

10.—The No. 1 Camphausen shaft, near Fishbach, in the department of the Saarbruck Collieries, has now reached the depth of 1650 ft., and may possibly become the deepest shaft in Prussian coal mining.

Although the depths to which the shafts enumerated have penetrated into the interior of the earth in the art and practice of mining may appear mighty, and may be an expressive witness of the great progress made in mining pursuits, yet, on the other hand, the above results may be considered insignificantly small when we compare them with the extent of the earth's crust and the diameter of the earth. The deepest bore-hole in the world is the artesian spring at Potsdam, in Missouri, which reaches a depth of 5500 ft.

FERRO-CHROMIUM STEEL.

In producing Bessemer steel, the usual charge of pig-iron—7 tons—is placed in a cupola furnace, and when this metal has been decarbonised by the process now well understood there is a waste of about 1 ton of iron, and 6 tons are consequently left to be carbonised or converted into steel. The invention of Mr. JULIUS BAUR, of Brooklyn, U.S., consists in adding ferro-chromio-manganese, obtained by direct reduction in the cupola furnace, of chrome ore in combination with spiegeleisen, or an iron rich in combined carbon and manganese. The amount of spiegeleisen or ferro-manganese required depends upon the character and grade of steel to be produced.

The spiegeleisen is generally melted in a cupola furnace, and Mr. Baur proposes before it is charged in to take about 300 lbs. of finely ground chrome ore, 40 lbs. of crushed anthracite, coke, gas graphite, or other refractory carbon of about the size of peas, 20 lbs. of ground borax and 15 lbs. of sand mixed well together. He then spreads out the whole, and makes some free space in the middle of the mass, and puts about 20 lbs. of fresh burnt lime into it; he then adds water to the lime, and when it is well hydrated he mixes the whole together like mortar and forms it into balls or bricks, and then dries them. Instead however of thus preparing the chrome ore, a similar result may be obtained by mixing it with borax and tar or pitch; in this case the borax should be burnt and pulverised, and the tar or pitch liquefied by heat. The whole is well mixed, and when cold the mass is broken up and used, the proportion of borax to the chrome ore is similar to that just described. The cupola is then to be charged with a great amount of fuel, preferably coke, and on the top of the fuel the balls or bricks are placed; on the top of the so prepared chrome ore another layer of about 1 to 1½ ft. of more coke is charged, and on the top of this the spiegeleisen or ferro-manganese is placed. When the whole charge is melted down he adds the metal to the decarbonised iron and proceeds as usual.

The points of importance for the success of the operation are—First, a heavy charge of fuel; second, the use of a borax flux; and, third, the presence of spiegeleisen or an iron which is rich in combined carbon and manganese on top of the prepared chrome ore. The spiegeleisen or ferro-manganese assists the liquefaction of the reduced chrome ore and prevents its oxidation, and without it no satisfactory result can be obtained. To produce a medium grade of steel he takes to the 7 tons of iron about 300 lbs. of chrome ore prepared as described, and about 1120 lbs. of spiegeleisen or ferro-manganese rich in carbon and manganese. The amount of prepared chrome ore may vary, but should not be less than about 100 lbs. and not more than about 600 lbs. of chrome ore to 7 tons of pig iron. The degree of hardness of the steel is regulated by the amount of spiegeleisen added to the decarbonised metal, the chrome acting to impart toughness and tenacity to the steel. Practical experience has shown good results by proceeding in the way described.

MOTIVE-POWER ENGINES.

In connection with rotary engines driven by steam, water, air, or other fluid, Mr. JOHN HARRIS, of Montreal, Canada, has introduced some improvements, which consist in constructing the engine in the form of wheels with tubes, pipes, passages, or chambers, arranged in such a manner that the motive fluid under pressure which is admitted into a central hollow shaft shall be caused to flow thereto from the circumference, and then back again to the central hollow shaft, whence the fluid escapes into a vacuum chamber, or into a discharge pipe, as the case may be. The exterior of the engine may have the form of a simple or compound circle, the circumference of which is a cylinder or chamber connected at each of its extremities with the hollow shaft of the engine by a conductor communicating with the supply and escape pipes respectively, or the engine may be constructed in the form of a helix or spiral expanding outwards from the central hollow shaft, and then contracting inwards (back again) to such shaft.

When considerable power is required Mr. Harris provides at suitable intervals on the tubes or chambers, of which the engine in great part consists, obstructions formed in various manners, such for example as flattened wires, discs, or spherical bodies, made of metal or other suitable material. The fluid thus enters from the central hollow shaft, and flows in a curvilinear direction through the chambers in order to reach the outlet, and its direct progress being more or less obstructed and impeded by the said flattened wire or other suitable obstructing medium, or in some cases by the friction only against the sides of the conducting chamber or pipe, the motion of the circulating fluid is communicated to the wheels constituting the engine. The chambers of which the wheels consist are so formed and connected in the centre that the whole apparatus is free to turn upon the central shaft as an axle, which shaft being hollow contains both the inlet and outlet pipe within it, and thus serves both as the axis of revolution of the engine and as its supply and exhaust chamber. The shaft, which is stationary, is formed at the parts where the wheels are fitted with circumferential slots, arranged so that as the wheels revolve a sufficient area of passage shall constantly be opened for the admission of the fluid into the revolving wheels, and for the egress therefrom. Working mechanical power may be communicated from the engine in motion, either from the hollow shaft by means of a driving wheel, or by the employment of a grooved or toothed wheel, which may be directly attached to the sides of the revolving chamber, or wheels of the engine, and which, consequently, partaking of the motion of the latter, will serve to transmit the power.

IMPROVED STEAM-BOILER.

The invention of Mr. EMILE BEDE, of Verviers, Belgium, relates to an improved construction of tubular steam-boiler in which the water is caused to circulate rapidly, and a large heating surface is obtained, and other advantages are realised. The shell of the boiler is formed of two semi-cylindrical, or nearly semi-cylindrical, portions disposed horizontally one above the other, and connected together by straight or flat vertical, or nearly vertical, sides. The middle of the boiler is traversed longitudinally by a horizontal case or chest of rectangular section containing vertical tubes. The plain or flat sides of the boiler, and those of the case or chest are strongly stayed together, so that the pressure of the steam on the two sides is counterbalanced. The other parts of the body or shell of the boiler being portions of cylinders are not liable to change their form, and do not require to be stayed. The upper and lower sides of the tube case or chest are stayed together by the tubes themselves, which are fixed at both ends. The furnaces may be internal or external. The brickwork and flues of the boiler are arranged so that the flames issuing from the back of the furnaces pass through the tube box, impinging upon the surface of the tubes therein, and return along the sides of the boiler to the chimney. The height of the boiler space above the tubes being sufficient to allow of the removal of the tubes, also allows suitable tools to be introduced into the tubes so as to cleanse them with facility. In some cases the flat-stayed sides of the boiler are replaced by two rows of tubes, the said tubes having plates affixed to them, so as to form with the said tubes the sides of the boiler.

Boilers constructed according to this modification of the invention when dismounted may be transported in several pieces to the place where they are to be set up, and there may be mounted without difficulty, as when the smoke boxes at the front and back of the boiler are placed in the position they occupied before the re-

spective portions of the boiler were taken apart, the upper and lower parts of the shell will necessarily occupy their exact position. These two parts may also be connected together by several vertical tubes on the sides of the boiler, by which the circulation of the water is promoted, and the cleansing of the boiler still more easily effected. For very high pressure it is necessary to make the upper portion of the shell of comparatively small diameter. In that case suitable holes closed by covers are made in it for the purpose of introducing and cleansing the tubes. In consequence of the great circulation of water, the cleansing of the tubes is very seldom necessary. It can, when necessary, be effected without opening the covers if the diameter of the shell be sufficient for a man to introduce into the tubes a brush hanging to a chain. For very high-pressure boilers of any size may be made by connecting together side by side several boilers constructed with small shells with the furnace between them.

ROCK-BORING MACHINES.—The invention provisionally specified by Mr. JOHN DARLINGTON, of Coleman-street Buildings, City, but for which he did not obtain a patent, relates to the method of mounting and fixing percussive rock-boring machines, by the use of which such machines may be more readily fixed, and more securely held in position whilst working, at the same time dispensing with much of the complication of parts at present in use. For this purpose he makes the outer surface of the cylinder circular, or of such a form that a screw thread may be cut on its external circumference throughout the whole or part of its length. This is fitted to work in a screwed nut, in which it is capable of turning freely. The said nut may be fixed to any support by any well-known means. He admits the fluid pressure through a revolving joint affixed to the cylinder in connection with the pressure chamber and distributing apparatus in such a manner that the cylinder may be rotated while being kept constantly in communication with the pressure. For advancing the apparatus as the hole is deepened it is simply necessary to cause the cylinder to rotate either by hand or automatically by means of a feed lever struck by the piston and acting on and turning the cylinder, when the cylinder will be screwed forward through the nut towards the working face. The reciprocating piston and piston rod with the boring tool attached may be connected to the cylinder and so made to rotate with it, or they may be turned by hand whilst the cylinder is turned automatically, or they may be turned automatically by any well-known method, while the cylinder is turned and fed forward by hand.

STEAM-BOILER FURNACES.—The feeding apparatus of the improved boiler furnace invented by Mr. R. A. WILSON, of Salford, consists of a pair of crushing rollers or other equivalent to reduce the fuel into small pieces, and to discharge it into a box, from which it is raised by a chain of buckets or other equivalent, and delivered into a trough placed above the hoppers of the furnaces. In this trough works an endless chain of scrapers, which carry the fuel forward and deposit it into the hoppers, from whence it is distributed on to the fires by revolving fans, which are driven by friction discs fixed on a line of shafts placed behind the hoppers. Each disc drives two pulleys fixed on the upright shafts of the fans, or one upright shaft may be driven by friction from the line shaft or by bevel gearing, and the other by toothed wheels on the edges of the fans, or otherwise. The improved grate bar consists of a stationary frame, to which two sets of movable grids are hinged; these grids are moved up and down alternately by eccentrics or cams acting on rods jointed to arms on the grids. When the one set of grids is raised the fuel slides down the incline on to the other grids, which are then stationary, and when the first set of grids assumes a horizontal position the other set is raised to carry forward the fuel. By this means the fuel is taken from the front of the furnace to the bridge.

IMPROVED SAFETY LIFTS.—The improved arrangement of warehouse lift invented by Mr. JOHN HINKS, of Birmingham, whereby such lifts are made very efficient in action, easily controlled by those having charge of them, and free from the liability to accident, consists in effecting the ascending and descending motions of the lift by means of a long and strong screw stationary vertically and passing through the middle of the apartment or cage to be raised and lowered. The cage has fixed in its top or bottom, or in both top and bottom, a screw box of a size proper for the screw to work in. The said screw is supported by and turns in bearings fixed respectively at the top and bottom of the well in which the apartment or cage rises and falls. On the lower end of the screw a bevel-toothed wheel is fixed, to which motion is communicated by another bevel-toothed wheel on a horizontal shaft. This shaft is provided with two fixed pulleys and two loose pulleys, the two loose pulleys being situated between the two fixed ones. Motion is communicated to the shaft described from a steam-engine or other prime mover by means of bands working over the pulleys described. One of these bands is crossed and the other uncrossed, so that without reversing the motion of the steam-engine, motion in one or other direction can be communicated to the screw by throwing either the crossed or uncrossed band on to its fixed pulley. When both bands are thrown on to the loose pulleys the screw is brought to rest. The bands are thrown on to and off their respective pulleys by means of forked levers, and these are operated upon by the person in charge of the lift through a vertical wire passing through the apartment or cage, by raising or lowering which wire he can give to the apartment or cage either an ascending or descending motion, or bring it to rest. The apartment or cage itself on reaching either the top or bottom of the well acts upon the forked levers described, and brings the screw to rest. A tube is fixed in the apartment or cage, through which tube the screw may pass. The apartment or cage is provided with antifriction guide rollers, and where the screw is of great length it may be kept steady by collars fixed in cross-heads. The screw passes through these collars, and vibratory motion in the screw is prevented by them. The cross-heads carrying the collars are not fixed in the well but are capable of sliding therein within certain limits. As the apartment or cage rises it picks up these cross-heads, carrying them with it, and as it descends it leaves them behind in their respective places. Instead of employing only one screw two screws may be employed. In this case the screws pass through the apartment or cage near opposite sides thereof, and the middle of the apartment or cage is thereby left unobstructed.

HEAT.—In continuing his lectures at the Royal Institution, Prof. Tyndall, with the aid of the thermo-electric pile and the galvanometer, illustrated the consumption of heat in the conversion of crystals into solution, salt consuming more heat in the process than sugar, and saltpetre more than common salt. This illustration was continued with alcohol and ether, showing the consumption of heat in the vaporisation of liquid. Water, placed under the air pump in company with sulphuric acid, which consumed the vapour of the water, could be frozen in that way. A simple experiment of this kind was shown—a glass vessel containing water was connected by a tube with another glass vessel exhausted of air, and covered with a cloth wetted with salt and water; the vapour from the water passing into the empty vessel was condensed, and during the course of the lecture the water, thus deprived of its heat, became frozen. With reference to the heat produced and liberated in molecular processes, Prof. Tyndall stated that 8 lbs. of oxygen and 1 lb. of hydrogen, combining to form 9 lbs. of water, produced an amount of heat which, expressed in mechanical force, would be sufficient to lift 47,000,000 pounds a foot above the earth's surface—in other words, its effect was equal to 47,000,000 foot-pounds. The first effect of the combination was to produce aqueous vapour, and in the passage of that vapour to water the amount of heat set free would be equal to the raising of 6,720,000 lbs. a foot above the earth's surface. In the passage of the 9 lbs. of water to ice, the heat liberated would be equal to 993,654 foot-pounds. In treating of the subject of liquefying gases, Prof. Tyndall produced snow from carbonic acid gas, and froze quicksilver in the process of melting the snow. In connection with this experiment, he referred to the deposition of snow upon the Alps by the rarefaction of the air blown from the plains of Lombardy; in the process of rarefaction work was done, in the doing of which heat was expended, and by the consequent reduction of temperature the moisture held in the air became condensed, and fell as snow.

MAY 26, 1877.

BALANCED HIGH-PRESSURE ENGINES.

The success achieved in the application of Bourne's patent high-pressure high-speed engines has already been noticed in the *Mining Journal*, and the inventor's reply to certain objections which have been raised against them affords another opportunity of mentioning them. He remarks that those who are conversant with such subjects very well know that it is not merely the weight which has to be balanced in fast-moving engines, but also the momentum. The whole of the momentum of the reciprocating parts is discharged at the end of each stroke upon the crank pin, and this would occasion a jerk and shock but for the introduction of an equal and opposite momentum which constitutes the balance, and which enables the work to be done as smoothly as if there were no reciprocation at all. Fans, centrifugal pumps, circular saws, and other rotating apparatus run smoothly at any speed. So will steam-engines do if the momentum of the reciprocating part is balanced by counter-weight, and this is precisely what is done in these engines. It has been objected again that these engines require a pressure of 100 lbs. to 150 lbs., whereas ordinary engines will work with from 15 lbs. to 35 lbs. with ease. To this the reply is that the engines do not require any greater pressure than other engines. But there is a plain difference between what is necessary and what is advisable. As the engine is a high-pressure one, any relevant comparison can only be with other high-pressure engines. And what competent engineer would recommend a high-pressure engine to be worked at 15 lbs. or even 35 lbs.? In all high-pressure engines the steam has to escape into the atmosphere, and, therefore, against a pressure of 15 lbs. per square inch. This back pressure has to be deducted in every case, and it is relatively very much larger when the impelling pressure is only 15 lbs. above the atmosphere than when it is 120 lbs. above it, which last is the pressure employed in Bourne's engines.

With regard to the advantages which the high-pressure high-speed system offers, Messrs. JOHN BOURNE and Co., of Mark-lane, the manufacturers, very truly observe that when people buy engines what they want to buy is power. They do not want to buy magnitude, or weight, or needless cost, or complication, and so long as the power is assured, combined with strength and durability, the smaller, the lighter, and simpler the engine is the better they will like it. The small cost of their engine, relatively with the power generated, speaks for itself, and the same may be said of its other most conspicuous qualities. Then, as the high-speed of piston enables them to carry expansion to a very large extent without entailing inconvenient magnitudes, and as the cylinders are steam-jacketed, and all other aids to economy have been availed of, the consumption of coal is very small. The almost continuous abstraction of steam from the boiler, incidental to the high-speed, enables the boiler to work without priming, even with a very moderate amount of steam-room, whereas priming is very apt to occur in slow engines, from the steam being drawn away in large gulps. It is clear that high-speed is conducive to equality of motion, which, for many purposes, is important, and in no case detrimental; and they think a fair consideration of what they here state will lead impartial inquirers to the conclusion that they have put forth no pretension in regard to their engines which they are not able fully to justify.

SOCIETY OF ENGINEERS.

The Transactions of this Society for 1876* have just been issued, and contain eight papers of considerable general interest, and the discussions which followed the reading of them. The recipients of the Society's premiums for the year were Henry Davey, for his paper on the Underground Pumping Machinery at the Erin Colliery, Westphalia; Charles E. Hall, for his paper on the Conversion of Peat into Fuel and Charcoal; and J. W. Pearse, for his paper on the Ventilation of Buildings.

The President for the year was Mr. Vaughan Pendred who, in his inaugural address, made several very useful suggestions. He has a very exalted opinion of the engineering profession, but enunciates it with surprising modesty, considering his reputation therein; so that when his assertions are reduced to logical form they are absolutely unanswerable. He states that in the highest sense of the term an engineer is a man who can not only invent or devise but execute; in a subsidiary sense every man who can construct is an engineer. Such an admirable definition can offend no one, for it will include not only the Telfords, the Stephensons, and the builders of such elegant bridges as that which recently doubled-up in Germany, but also the entire manufacturing population of the world, from Sir Joseph Whitworth to the itinerant tinker; it will account, too, for the freedom with which the title of engineer is assumed by men of all classes and possessing various degrees of knowledge, and should have the effect of largely increasing the number of members of that useful society of which Mr. Pendred is the able representative. Admitting that every man who can construct is an engineer, there will be less difficulty in accepting the President's gratifying assurance that the whole army of engineers—civil and mechanical—has operated from the earliest ages to the present moment in the achievement of a great work, no less a work than the civilisation of mankind, and that he is enunciating a great truth in declaring that engineers have done more to raise men to the high level which they now occupy than even the philosopher or the statesman; that engineers are the great civilisers of mankind, and that nearly all that is good, or pleasant, or worth having in modern life—happy engineers!—results from their labours; and he maintains that if it be not within the power of our profession to dissipate the clouds which have long hovered over this country, the members of no other profession can.

By way of suggestion he remarks that English engineers would do well to display a little more energy than they have recently done in suggesting new works—new operations which will either afford good investments for capitalists, or will promote the well-being of the people of this nation. With regard to the Society of Engineers itself, his suggestions are not only valuable but equally applicable to printing societies generally. He remarks that the society has been formed that its members may mutually instruct each other, the form of instruction consisting in the reading and discussion of papers, and their publication. If there be no papers, the object of the society is frustrated; they are the life-blood of the body. It is an erroneous popular idea that a paper must be very elaborate and illustrated by a host of diagrams. But a paper ought not to be a treatise. Every member has some speciality, and knows more about some engineering subject than about any other; he is, therefore, competent to teach others something about his speciality. He need not teach in long pages of words, and may be able to say all that is required in five or ten minutes. In truth, the society is in danger of being sunk under ponderous papers: they get very few, and they are so big. Why should we not, the President asks, have as many as two or three short practical papers read every month? They might all be read the same night. The labour of preparation would be small. They should be put together with care, of course, but there would not be much hard work in them. The general adoption of the class of paper recommended by Mr. Pendred would unquestionably have a most beneficial influence on the vitality of a society.

With regard to the papers contained in the volume, the first is by Mr. P. F. Nursey, the secretary, on the Channel, advocating the scheme of Mr. P. J. Bishop, which has been already noticed in the *Mining Journal*. In the discussion which followed Mr. Buckham showed that the character of the Channel bed had not been sufficiently studied, and the reply of the author of the paper did not give evidence of an acquaintance with the history of the formation of the Straits of Dover by the separation of England from the Continent, or of the changes going on upon the French and English coasts even within historical times, which would suffice to prove the absurdity of any scheme for constructing a communication with any hope of durability above the Channel bed, whether by tube or bridge. Mr. Spice made observations which, if considered and worked out, leave no doubt that the prospects of ever making a tunnel through the solid are very discouraging; and Mr. H. W.

* Society of Engineers. Transactions for 1876. Edited by PERCY F. NURSEY, M.S.E., secretary. London: E. and F. N. Spon, Charing Cross.

Pendred complained of the absence of evidence that the Channel railway if constructed would pay. It has already been shown in the *Mining Journal* that to secure the capitalists supplying the money 3 per cent. upon their investment it would be necessary that, besides the goods traffic that might pass over the line, the entire populations of London and of Paris should travel over it daily. Mr. Nursey estimates an expenditure of 25,000,000/- for effecting the communication, and only hopes for a revenue of 2,500,000/- which is equal to 10 per cent. on the capital. One of the many errors he makes is in considering this amount as available for dividends, whereas a far larger sum would be necessary for working expenses and keeping the railway in working order. Mr. Cargill did not believe that a tube, tunnel, or bridge would ever pay as a commercial enterprise, as the proceeds would be earned upon only 21 miles of railway, which was but a very small portion of the total distance between London and Paris; he regarded like sewage schemes as one in which remuneration or payment could not be hoped for.

The other papers are on Air Compression, by A. H. C. Trewman; on Stone Machinery, by Henry Conradi; on the Rolling of Ships, by Wm. McNaught; and those which have already been mentioned as having been awarded premiums. The Transactions are admirably and carefully edited, and will form a really useful work of reference.

REDUCTION OF SILVER ORES.*

The ores raised at the Tajo Mine, at Rosario, near Mazatlan, are essentially mixtures of quartz with argentic sulphide, and probably some silver and gold, together with some galena, brown blende, and pyritic minerals; the average contents of silver being 40 ozs. and of gold 2½ ozs. to the ton, with from 6 to 8 per cent. of lead and zinc. The reduction is effected by the American method of pan amalgamation without previous roasting. The ore is partially divided by hand-picking into rich and poor classes, without, however, attempting to remove any of the lead or zinc minerals, which are passed by a mill of 20 stamp heads, with rotating lifters weighing 7 cwt., and making 60 9-in. strokes per minute, through grates having apertures ½ in. in diameter, 24 tons being stamped daily. The slimes pass first into a pit 33 ft. deep, and 98 ft. in cross section, where the richer material forming the normal ore for the pans is deposited, after which a second collection of poorer stuff is made in a second pit of the same size, and finally the waste, together with that from the pans, is passed through a series of catch-pits 9 ft. long, 5 ft. broad, and 3 3 ft. deep.

The reduction of the richer slimes is effected in pan amalgamators of the improved Varney pattern, which perform the three operations of grinding the particles of ore to impalpable mud, mixing the particles with the chloridising agent, and reducing and amalgamating the silver minerals. The pan is essentially a mill, with cast-iron instead of stone grinding surfaces, which is adopted partly from economy and partly from the property possessed by iron of reducing the mercurial chlorides. These surfaces are put together in segments, so as to be easily renewable, as they are worn out in 40 days when worked at 70 revolutions per minute. The charge of the pans is 800 lbs. of ore stuff from the stamps, which is mixed into a thin mud by adding water and running the pan for half-an-hour or an hour until the materials are sufficiently ground. During this period a jet of steam is introduced in order to warm up the contents to 175° Fahr. Chloridising and reducing agents are then added in the following proportions—sulphate of copper 4 lbs., salt 40 lbs., and mercury from 70 lbs. to 90 lbs., including 4 lb. of zinc amalgam, or about 13 times as much salt and 32 times as much mercury as is used in the Mexican or "patio" process of amalgamation. The copper salt is added in somewhat larger quantity than would be required for the chlorination of the whole of the silver, assuming it to be effected by cupric chloride. The reactions are considered by the author to be substantially the same as those in the "patio" process, and as probably occurring in the following order—amalgamation of metallic silver and gold; conversion of cupric sulphate into chloride; conversion of silver sulphide by cupric chloride, with the formation of cuprous chloride, into silver chloride; reduction and amalgamation of the latter by metallic mercury; and, finally, decomposition of the mercurial chlorides formed by the iron of the pan. The zinc amalgam is said to help by the production of electric currents. Like the Mexican process, the method is not well suited for the treatment of minerals containing lead, zinc, or antimony, the working of such ores being attended with a considerable loss of silver and mercury.

The amalgamation process proper requires about four hours, the progress of the operation being controlled by washing out samples of the mud at intervals, and observing the colour and form of the mercury globe obtained, which should be grey, and "tail," or assume an oval form.

The finished charge from the pan is received in a cylindrical washing vat, or settler, and allowed to rest for an hour, whereby the bulk of the mercury and amalgam separate from the mud, and fall to the bottom. Afterwards the lighter particles are removed through a hole in the side by a stream of water, which flows for 50 minutes; lastly, the bulk of the mercury is separated from the remaining heavy mud charged with ore, by drawing it from a lower opening into 10 minutes. As the amalgam is very poor, owing to the large quantity

* From JAMES FORREST'S "Abstracts of Papers in Foreign Transactions and Periodicals," for the Proceedings of the Institution of Civil Engineers.

of mercury used, only the excess of the latter introduced at the washing above a large fixed amount is removed in clearing the settler, the whole quantity being only removed at intervals of eight days.

The waste or tailings of the first operation, consisting largely of heavy metallic sulphides, with probably some silver sulphide, are reworked in four large pans or "tailing mills," which take charge similarly arranged. An assay of this material gave 28 ozs. of silver per ton, and appeared by fanning to consist of 9-10ths of quartz, and 1-10th of heavy sulphides, pyrites, blende, and galena. The reagents used per 1600 lbs. charge are—salt 40 lbs., sulphur 5½ lbs., and mercury 120 lbs., the latter being about 70 times the weight of the silver in the ore.

The working of the tailings both in the pans and settlers is exactly similar to that in the ore mills. The waste from the last washing, containing about 1 oz. to the ton, is passed through a catchpit before being allowed to run to waste. A further quantity of 20 per cent. of silver is recovered by the second operation, showing the final loss to about 15 per cent. of that contained in the ore. Allowing four hours for filling of the tailing tanks, the extraction of the silver in 16 hours. The amalgam collected is treated at intervals by filtering through canvas, after which it is washed in quantities of a hundredweights at a time in a pan with water to clear it from mechanical impurities, filtered a second time, and finally heated in retorts holding 1200 lbs. The time required for distillation is from 8 to 15 hours, on account of the great variability in its composition. The sponge silver for the retorts is melted in blacklead crucibles holding 50 lbs., and run into bars.

The great advantage of the pan process, as compared with other metallurgical operations—speed and cheapness of work, together with large production from a small plant, are, in the author's opinion, obtained by a considerable waste of silver, which he calculates as 187 per cent. of the total quantity, and as due to the effect of the lead and zinc ores. Nearly the whole of the gold is, however, saved. The loss of mercury is 2 lbs. per 2000 lbs. of ore treated, or 80 per cent. of the weight of the silver. The staff required is very small. With 12 men of all descriptions about 17 tons of ore are treated per day. The machinery is driven by steam power, the cost of working two engines being about 8d. daily. The total cost of working, including wages, materials, wear of machinery, &c., is about 21 per cent. of ore treated, or about 1s. 2d. per ounce of silver recovered.

—By H. RICHTER: Zeitschrift für Berg-, Hütten- und Salinenwesen.

HEATING WATER FOR STEAM-ENGINES.—The construction of the apparatus proposed by Mr. JOHN COLES, of St. George's-road, Regent Park, is to consist of three cylinders of unequal diameter, so as to be inserted in each other, and forming a space between each for the exhaust steam and water. The innermost or smaller cylinder is to receive a portion or the whole of the exhaust steam, and passing through the same into the outer or larger cylinder, and returning back over the central cylinder, and thereby enclosing with exhaust steam internally and externally the space caused both by the smaller and central cylinders which contains the water to be heated. The space in the small cylinder and of the large cylinder which contains a constant supply of exhaust steam is very large compared with the space which contains the water to be heated, which is being pumped or injected cold in one end of the cylinder, and is passed out of the other end into the steam-boiler at a boiling point instantaneously on putting the engine in motion for work, thereby giving a constant supply of boiling water caused by the utilising of the exhaust steam after having given its power to the engine.

PLANING AND SLOTTING MACHINE.—The invention of Mr. GAI BAILEY, of Crewe, consists in applying two cutting tools to planing, shaping, slotting, and other similar machines, which tools are brought alternately into and out of operation, so that one of the tools is always in action, as the article to be operated upon is moved to and fro. Each cutting tool is fixed in a separate slide forming a duplex tool box, and these slides are raised and lowered alternately by a double cam fixed on a shaft on which is a worm-wheel, which is turned partly round by a worm fixed on the same shaft as a pulley. The ordinary self-acting feed gearing in connected to a lever which is fixed to a driving pulley, and as this lever is moved up and down by a feed gearing a band from the driving pulley gives motion to the pulley on the worm shaft, and thereby raises one of the tools and depresses the other, or the cam shaft may be acted upon by a lever direct from the feed gearing, or in any other convenient manner. By this invention a great saving in time is effected, as the machine is rendered double acting—that is to say, one tool is always in operation both in the forward and in the return stroke.

HOLLOWAY'S OINTMENT AND PILLS—OLD SORES, WOUNDS, AND ULCERS.—The readiness with which Holloway's ointment removes all obstructions in the circulation of the vessels and lymphatics explains their irresistible influence in healing old sores, bad wounds, and intolent ulcers. To insure the desired effect the skin surrounding the diseased part should be fomented, dried, and immediately well rubbed with the ointment. This will give purity to the foul blood and strength to the weakened nerves, the only conditions necessary for the cure of all these hideous ulcerations which render life almost intolerable. So sooner is this ointment's protective power exerted than the destructive processes cease, and the constructive business begins. New healthy growths appear to fill up the lately painful excavated pit.

BORING AND SINKING.

WILLIAM COULSON AND SON

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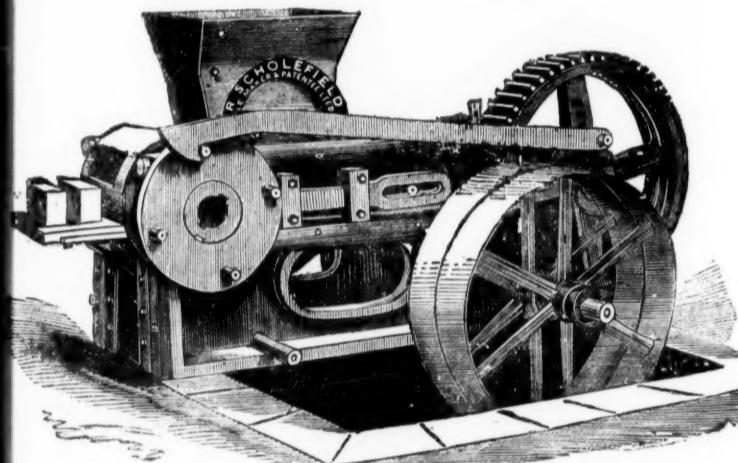
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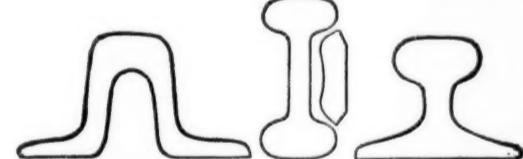
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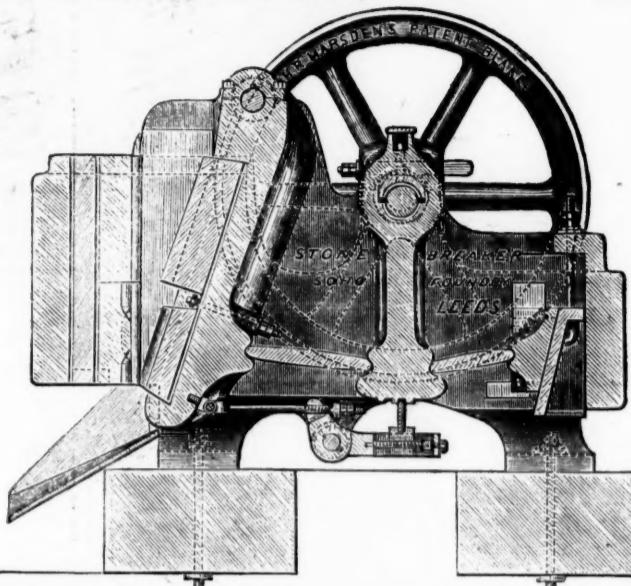
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